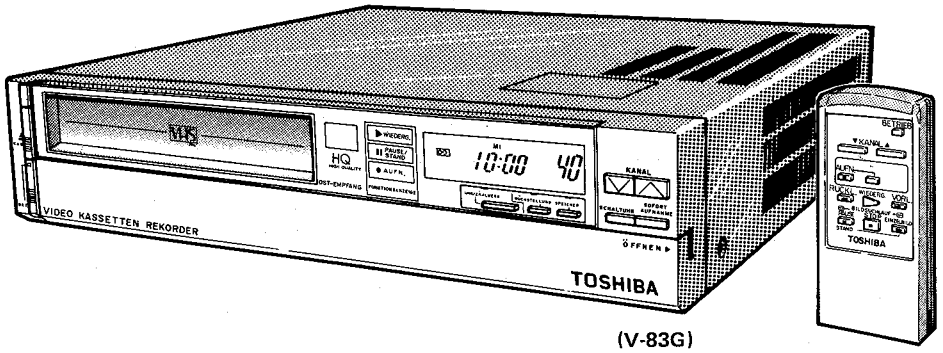
SERVICE DATA
FILE NO. 030-161

TOSHIBA
COLOR VIDEO CASSETTE RECORDER
V-81/83G, 81/83W



(V-83G)

SPECIFICATIONS

GENERAL

Video recording system:	Head configuration 2-head rotary
Video signal:	CCIR standard, PAL color
Storage temperature:	–20° to +60°C (–4° to +140°F)
Operating temperature:	5° to 40°C (41° to 104°F)
Antenna:	75-ohms external aerial terminal for VHF and UHF
Channel coverage:	

	STD	CATV
VL: Lower VHF band	E2 – E4	S21 – S23, S1 (V-81/83G Only)
		X – S1 (V-81/83W Only)
VH: Higher VHF band	E5 – E12	S2 – S20
UHF band	21 – 69	

	a total of up to 16 preselected channels
AERIAL output signal:	UHF channel E31 to E39 (selectable)
Power requirements:	AC 220V, 50 Hz
Power consumption:	30W
Weight:	7.7 kg (V-81W), 7.8 kg (V-83W), 7.9 kg (V-81/83G)
Dimensions:	430 x 95 x 375mm (W/H/D)

VIDEO

Input:	VIDEO LINE IN: Phono jack, 1.0V (p-p), 75-ohms, unbalanced, sync, negative
Output:	VIDEO LINE OUT: Phono jack, 1.0V (p-p), 75-ohms, unbalanced, sync, negative
Signal-to-noise ratio:	Better than 43 dB

AUDIO

Input:	AUDIO LINE IN: Phono jack, 50 k-ohms, –10 dBs
Output:	AUDIO LINE OUT: Phono jack, less than 10 k-ohms, –7 dBs, unbalanced
Frequency response:	80 to 8 kHz
Signal-to-noise ratio:	Better than 40 dB

TAPE TRANSPORT

Tape speed:	23.39 mm/sec.
Maximum recording-time:	4 hours (with E-240)
Fast forward time:	Within 5 min. (E-180)
Rewind time:	Within 5 min. (E-180)

TIMER

Fluorescent digital display
Count down from AC-line frequency.

Caution: Copyright Act 1956 Users of video recording equipment should note that it may be unlawful to record television broadcasts, chinematograph films or video recording without the permission of the relevant copyright owner.

Design and specifications are subject to change without notice.

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1. OVERVIEW

1-1 VHS Format

The VHS format has been specified to assure correct operations of VHS type VTRs (Video Tape Recorder) and to maintain interchangeability between VHS type cassette tapes. The format has specifications as described below.

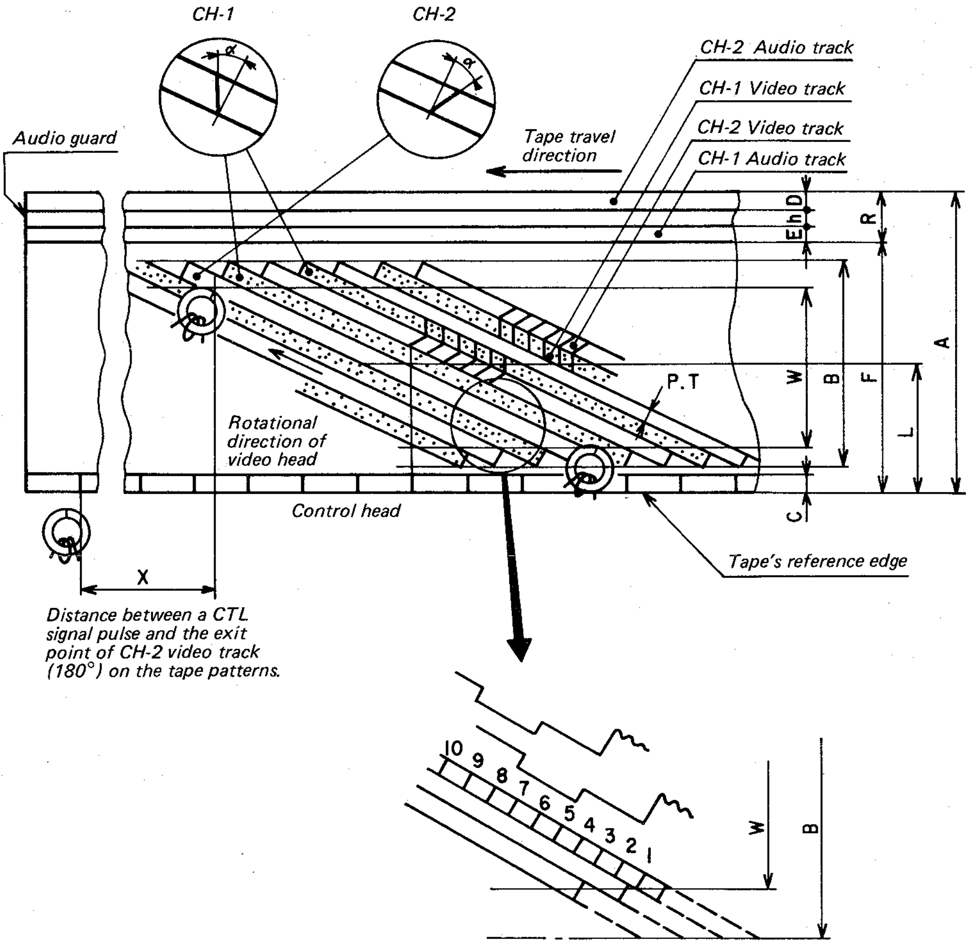
(1) Magnetic tape pattern

The tape pattern in the VHS format features:

- Guard bandless recording
- Azimuth angle of ±6 degrees, and
- "H-alignment"

1. Since a guard bandless recording system is employed a signal on an adjacent track will be reproduced in addition to the signal on a desired track if a tracking deviation is caused by any reason in the playback mode, thus causing undesirable crosstalk signals. Of the crosstalk signals, higher frequency components of a luminance FM signal can be removed by making use of azimuth loss effect of the heads. However, lower frequency components of the luminance FM signal can not be removed sufficiently because of poor azimuth loss effect to the lower frequencies.
2. To compensate the poor azimuth loss effect in the lower frequency range, a line correlation between tape patterns is introduced to remove the lower frequency components of the crosstalks. That is, each horizontal sync pulse is recorded so that it is always aligned with other sync pulses on the adjacent tracks. This is called "H-alignment".
3. Under this condition, crosstalks have frequencies close to a playback FM frequency of the main signal and develop considerably lower interference signal when they are demodulated.
4. Moreover, with the "H-alignment" established, skew distortion, which is caused when a video head traces on two or more tracks in a mode such as Cue or Review, will cause almost no problem because of horizontal sync signals reproduced in the specific period.

   Fig. 1-1-1 shows magnetic tape patterns in the VHS format. Table 1-1-1 shows specifications for the patterns shown in Fig. 1-1-1.



Distance between a CTL signal pulse and the exit point of CH-2 video track (180°) on the tape patterns.

Tape patterns viewed from magnetic material coated.

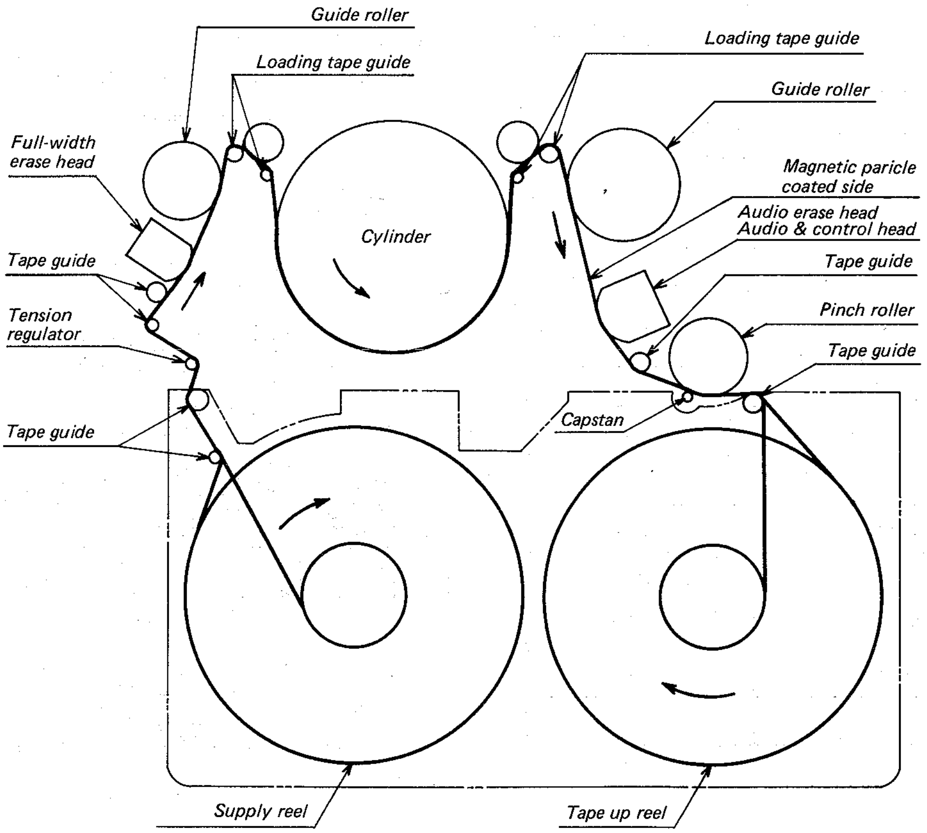
Fig. 1-1-1 Magnetic tape patterns

Table 1-1-1 VHS specifications

Items			Specifications	Note
1.	(A) Tape width	mm	12.65 ± 0.01	
2.	(Vt) Tape travel speed	mm/sec	23.39 ± 0.5%	
3.	(ϕ) Cylinder diameter	mm	62 ± 0.01	Upper cylinder
4.	(Vh) Relative speed	m/sec	4.85	
5.	(P) Video track pitch	mm	0.049	
6.	(B) Video fullwidth	mm	10.60	
7.	(W) Video width	mm	10.07	
8.	(L) Video track center	mm	6.2	From reference edge of tape
9.	(T) Video track width	mm	0.049	
10.	(C) Control track width	mm	0.75	
11.	(R) Audio track width	mm	1.0	Single track
12.	(D) Audio track width	mm	0.35	CH-2 (R)
13.	(E) Audio track width	mm	0.35	CH-1 (L)
14.	(F) Audio track reference edge	mm	11.65	From reference edge of tape
15.	(h) Audio track guard width	mm	0.3	
16.	(θ_0) Video track angle		5° 56′ 7.4″	During tape stopped
17.	(θ) Video track angle		5° 57′ 50.3″	During tape running
18.	(α) Video head azimuth angle		6° ±10′	
19.	(X) Position of audio and control heads	mm	79.244	
20.	Position of V-sync front porch		5 – 8H	Inside from lower end of W
21.	Back tension of tape		30 – 45 g	Beginning of tape wound cylinder entrance

Tape Path

(This is not standardized, but shows a general arrangement in the VHS mechanism.)



Guide roller
Loading tape guide
Full-width erase head
Tape guide
Tension regulator
Tape guide
Cylinder
Loading tape guide
Guide roller
Magnetic paricle coated side
Audio erase head
Audio & control head
Tape guide
Pinch roller
Tape guide
Capstan
Supply reel
Tape up reel

(2) Video cassette

VHS type video cassettes have specifications as follows:

a. Video tape

Length: Determined by a length calculated by the following equation, depending upon nominal recording or playback time.

$L = (1.42t + 2)^{+3}_{-0}$

Where L: Tape length (m)

t: Recording or playback time

L should be integer with all decimal points rounded-up

Width: 12.65 ±0.01mm

Allowance of width: Less than 6μm

Thickness: 19 + 1, −2μm

Coercive force: Optimum recording current for 600 oersted (nominal) class should not differ from that of the reference tape.

b. Leader tape and trailer tape

Length: When recording or playback time
exceeds 90 min: 170 ±20mm
not exceeds 90 min: 150 ±20mm

Width: 12.65 ±0.03mm

Thickness: 40 +5, −25μm

Material: Polyester film

Light transmissivity: Higher than 50%

Splicing length: 12 – 19mm

Splicing clearance: 0 – 70μm

Splicing strength: Higher than 3 kg

c. Reel

Outside diameter: 89 ±0.2mm

Hub diameter: When recording or playback time
exceeds 90 min.: 26 ±0.15mm
not exceeds 90 min.: 62 ±0.2mm
is less than 30 min.: 70 ±0.2mm allowable

Margin of wrapping: More than 1.5mm

d. Types and indication

Types of blank cassette

Type	Record or playback time	Length of video tape
E-240	240 min.	343^{+3}_{0}m
E-180	180 min.	258^{+3}_{0}m
E-150	150 min.	215^{+3}_{0}m
E-120	120 min.	173^{+3}_{0}m
E-90	90 min.	130^{+3}_{0}m
E-60	60 min.	88^{+3}_{0}m
E-30	30 min.	45^{+3}_{0}m

e. Shape and dimensions of cassette

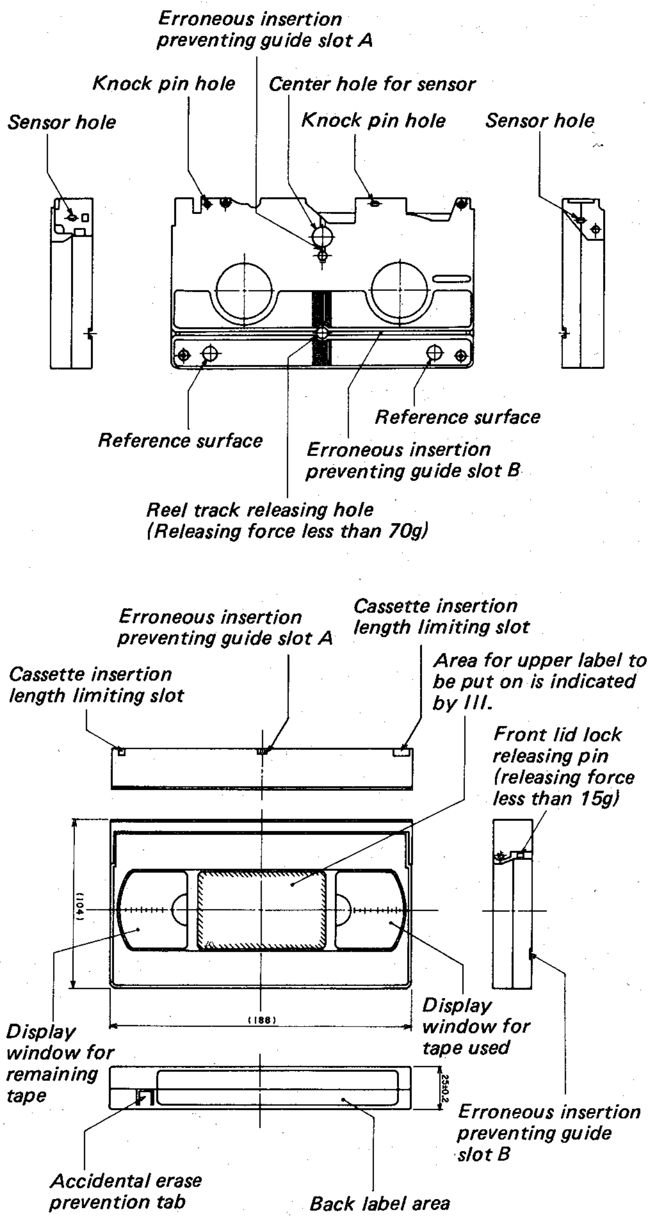

Erroneous insertion preventing guide slot A
Knock pin hole
Center hole for sensor
Sensor hole
Knock pin hole
Sensor hole
Reference surface
Reference surface
Erroneous insertion preventing guide slot B
Reel track releasing hole (Releasing force less than 70g)
Erroneous insertion preventing guide slot A
Cassette insertion length limiting slot
Cassette insertion length limiting slot
Area for upper label to be put on is indicated by ///.
Front lid lock releasing pin (releasing force less than 15g)
(104)
(188)
Display window for remaining tape
Display window for tape used
25±0.2
Erroneous insertion preventing guide slot B
Accidental erase prevention tab
Back label area

Fig. 1-1-2

f. Tape threading

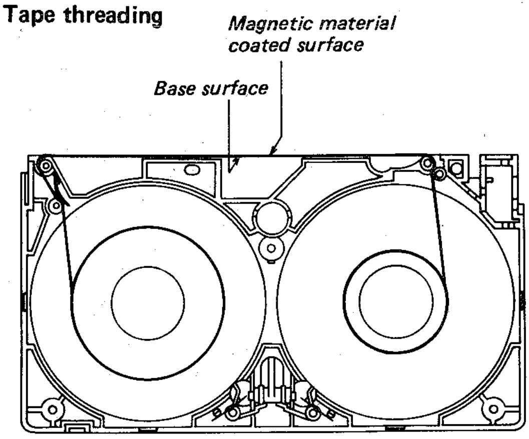

Magnetic material coated surface
Base surface

Fig. 1-1-3

(3) Recording system

a. Video signal recording system

Recording signal: CCIR B/W and PAL, SECAM color TV signals.

Luminance signals for black & white and color signals: FM recording

Carrier color signal: PAL: Down converted phase shifted direct recording.

b. Luminance signal record system

Pre-emphasis characteristic: T = 1.3 ±0.05μsec
X = 4 ±0.3

FM carrier frequency: WHITE PEAK 4.8 ±0.1 MHz
SYNC TIP 3.8 MHz ±0.1 MHz

FM carrier frequency deviation: 1 ±0.1 MHz

White clip level: 160 $^{+10}_{-5}$ % (from sync tip)

Dark clip level: 40 ±10% (from sync tip)

(100% is assured from sync tip to white peak.)

Recording current characteristics

FM signal record amplifier characteristic: For frequencies more than 3.8 MHz. . . saturated optimum record current.

For currents at 2 MHz and 1 MHz. . . 3 dB ±1dB and 6dB ±1.5 dB referred to 0 dB current of 3.8 MHz, and flat response at frequencies less than 1 MHz.

Bandwidth of converted carrier color signal: Constant current response

Head current of FM signal: ±1.5 dB within optimum record current at 4 MHz

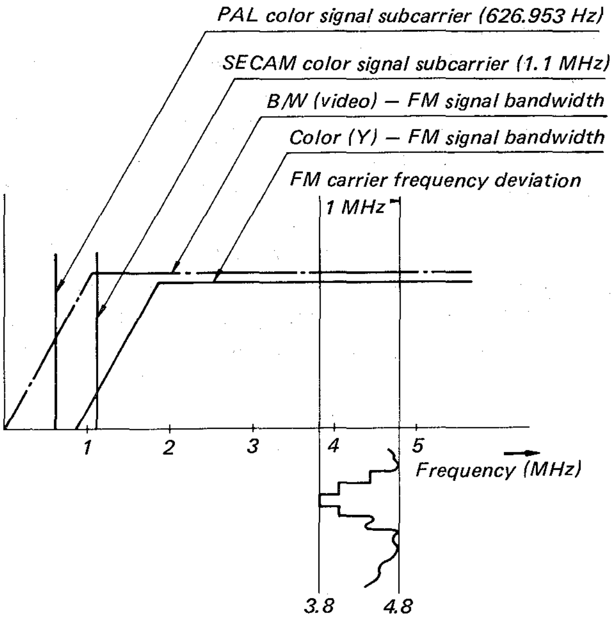
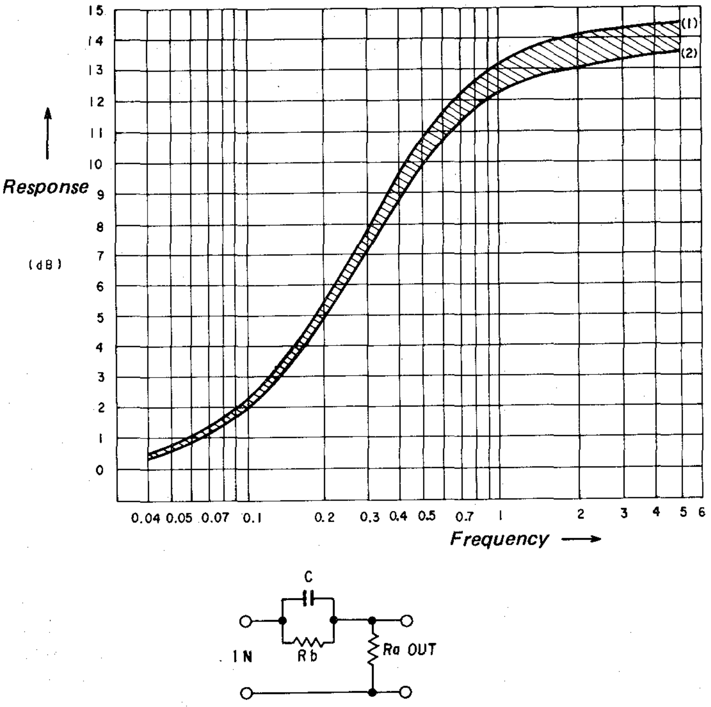


Fig. 1-1-5 Recording signal spectrum



T = C · Rb = 1.3 μ sec±0.05 μ sec

$X = \frac{Rb}{Ra} = 4 \pm 0.3$

T = 1.35 μ sec
X = 4.3 } ······(1)

T = 1.25 μ sec
X = 3.7 } ······(2)

Fig. 1-1-6 Pre-emphasis characteristic

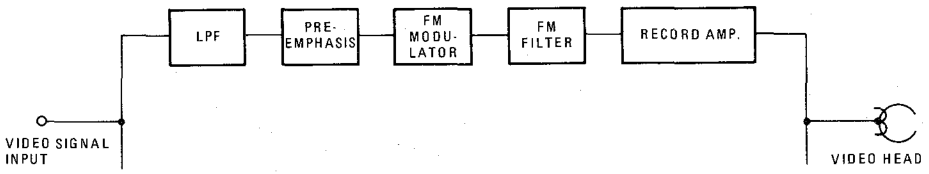


Fig. 1-1-7 Basic block diagram of recording system

c. Color signal recording system

Fig. 1-1-8 shows a block diagram of a color recording system in the VHS system.

Converted carrier color signal frequency: fc = 40 x f_H + 1.953 Hz (626,953 Hz)

(Where f_H stands for the horizontal sync frequency of an input video signal)

Record conversion carrier color signal phase:

CH-1: Constant (6° rightward in head azimuth).

CH-2: phase is retarded by 90° every one horizontal period. (6° leftward in head azimuth).

Phase switching per line of the record carrier color signal is performed at a position equivalent to horizontal sync signal period or the front porch, and the burst phase should be free from any deterioration.

Recording level of converted carrier color signal:

−7 – −10 dB (in playback output level) from the saturation level.

Video head polarity: Shall coincide between the channels.

Time difference between luminance signal and converted color signal: Shall be less than 0.1μsec on video tape.

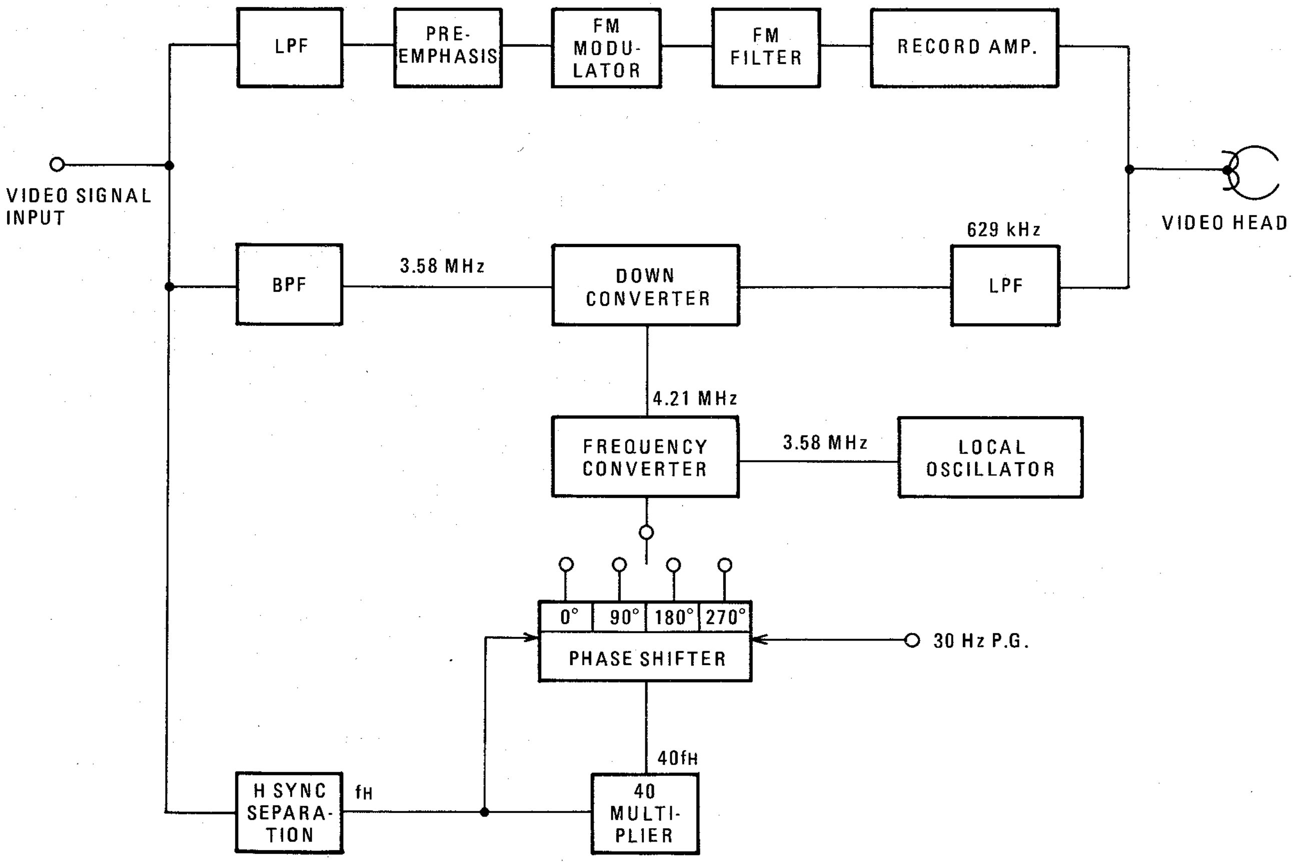

LPF
PRE-EMPHASIS
FM MODULATOR
FM FILTER
RECORD AMP.
VIDEO SIGNAL INPUT
VIDEO HEAD
BPF
3.58 MHz
DOWN CONVERTER
629 kHz
LPF
4.21 MHz
FREQUENCY CONVERTER
3.58 MHz
LOCAL OSCILLATOR
0°
90°
180°
270°
PHASE SHIFTER
30 Hz P.G.
40fH
H SYNC SEPARATION
fH
40 MULTIPLIER

Fig. 1-1-8 Block diagram of PAL signal recording system

(4) Recording format of control signal

Recording level: The control signal should be recorded with a level higher than a saturation recording level on the control track.

Correlations among waveform, polarities of control signal and video heads should be as follows:

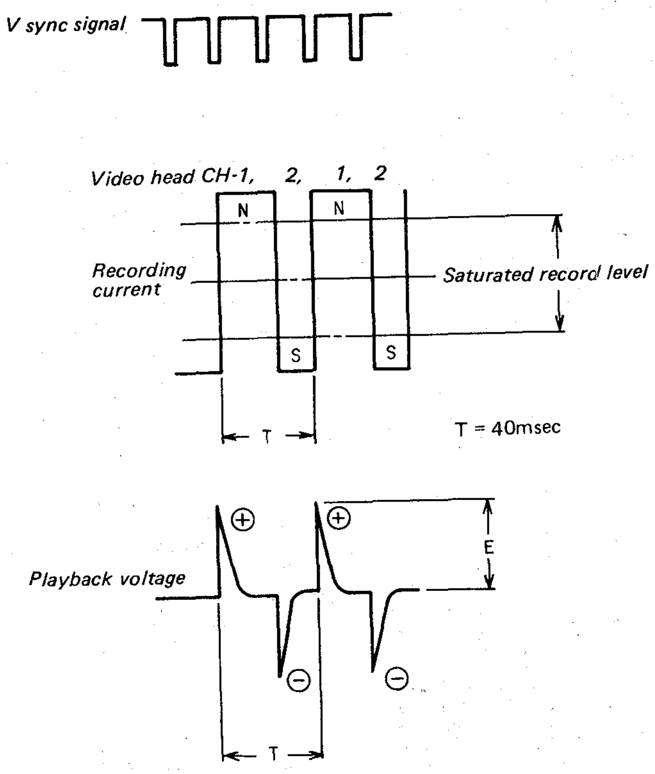

V sync signal
Video head CH-1, 2, 1, 2
N
N
Recording current
Saturated record level
S
S
T
T = 40msec
⊕
⊕
E
Playback voltage
⊖
⊖
T

Fig. 1-1-9

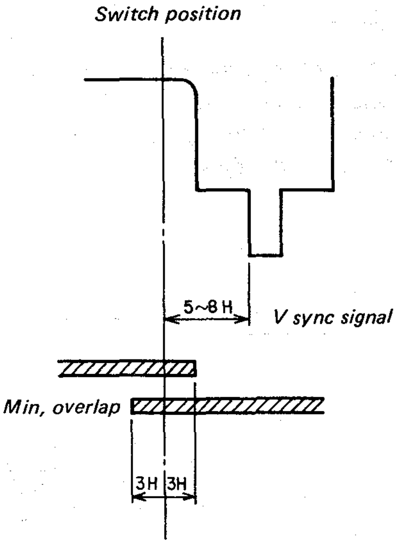

Switch position
5~8 H
V sync signal
Min, overlap
3H
3H

Fig. 1-1-10

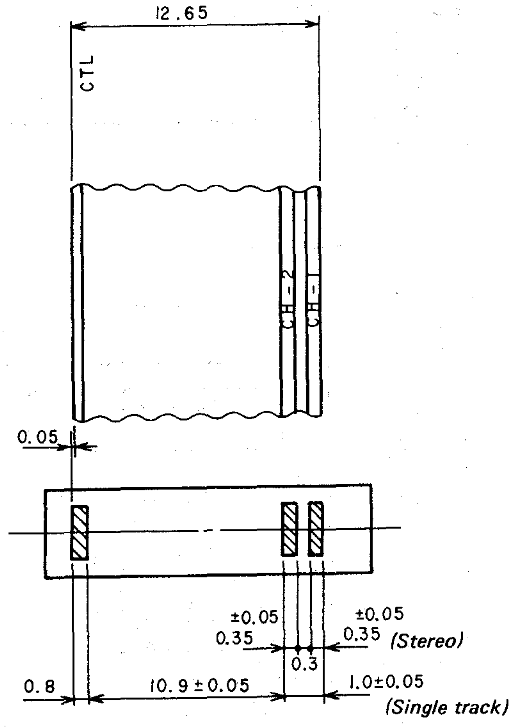

12.65
CTL
CH-2
CH-1
0.05
±0.05
0.35
±0.05
0.35 (Stereo)
0.3
0.8
10.9 ± 0.05
1.0±0.05
(Single track)

Fig. 1-1-11 Audio and control head

Note: Gaps for a control head and an audio head should be aligned in line.

2. OPERATION THEORY, MECHANISM

2-1. Outline

2-1-1 Mechanism system configuration

Fig. 2-1-1 shows a diagram of mechanical system configuration consisting of functional blocks. In addition to this a tape transport adjusting mechanism is included.

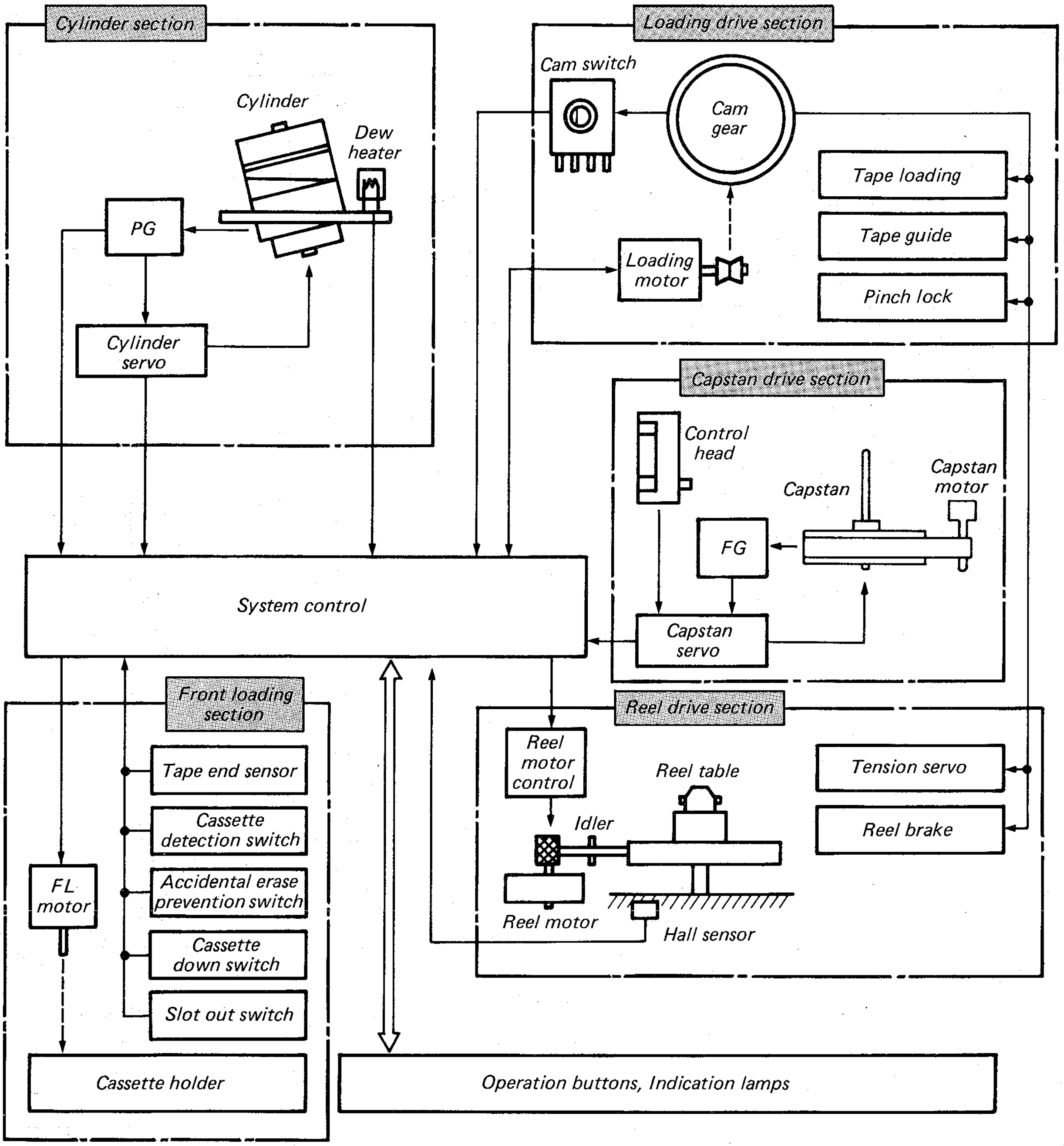

Cylinder section
Cylinder
Dew heater
PG
Cylinder servo
Loading drive section
Cam switch
Cam gear
Tape loading
Tape guide
Pinch lock
Loading motor
Capstan drive section
Control head
Capstan
Capstan motor
FG
Capstan servo
System control
Front loading section
Tape end sensor
Cassette detection switch
Accidental erase prevention switch
Cassette down switch
Slot out switch
FL motor
Cassette holder
Reel drive section
Reel motor control
Reel table
Idler
Reel motor
Hall sensor
Tension servo
Reel brake
Operation buttons, Indication lamps

Fig. 2-1-1 Mechanical system diagram

2-1-2 Description on each functional block

(1) Front loading

The front loading mechanism consists of the following main parts.

Mechanical Parts	● Cassette holder ● Guide bracket ● Slot mechanism ● Door control mechanism ● Cassette dual insertion protection mechanism ● Cassette lid opening mechanism
Electrical Parts	● FL motor ● Cassette insertion detection switches (L, R) ● Cassette down detection switch ● Accidental erase prevention ● Slot out detection switch ● Tape end detection switch

(2) Loading drive

Loading drive operations are performed in the following orders.

1 The loading motor rotates the cam gear.
2 The rotating cam gear moves the pinch lock lever, logic slider and the brake slider, thus setting each part of mechanisms to a specified mode.
3 The loading motor also rotates the loading ring and moves the S, T sliders, thereby wrapping a tape around the cylinder or unwrapping the tape from the cylinder.

(3) Reel drive

1 The reel motor rotates the T-reel table or the S-reel table through an idler.
It is determined by swing direction of the idler (depending upon rotating direction of the reel motor) that which one of the reel tables is driven.
2 In the playback mode, the reel motor is driven by a constant current source to develop a constant torque.
The band brake which is wrapped around the S-reel table applies a specified tension to the tape.
3 Detection of rotating reel tables is performed by magnets mounted under the T-reel table and hall sensor.

(4) Capstan

1) A out drive system is employed in the capstan drive system.
Speed control in the playback mode is conducted by a FG servo system and a phase control circuit using control pulses.

(5) Cylinder

The cylinder is driven by a built-in direct drive type motor.

Rotating speed control of the cylinder is conducted by detecting rotating speed of the rotor with a PG head.

To prevent dew condensation on the cylinder surface, a dew heater is provided. The heater operates when the main power is turned off and the cylinder is in stop.

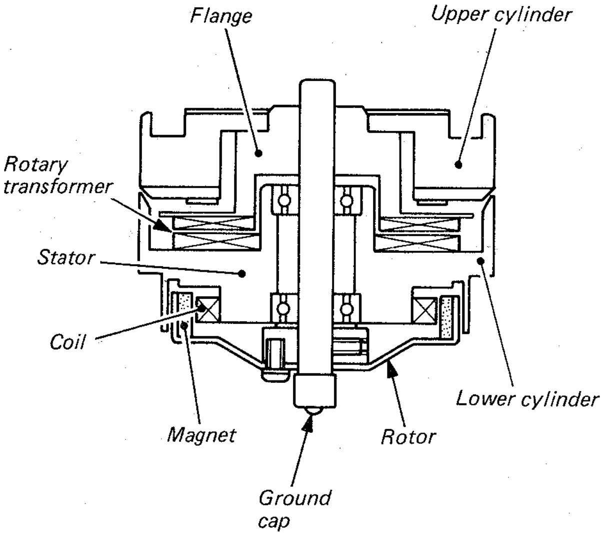


Fig. 2-1-2 **Structure of cylinder**

(6) Tape transport adjustment mechanism

This adjustment mechanism consists of following parts:

1. Nos. 3 and 8 guide posts
2. S- and T- guide rollers
3. FE and ACE heads

The purpose of the transport adjustment is as follows:

- To obtain a playback RF signal envelope with fine linearity.
- To adjust azimuth control position to assure good interchangeability of cassette tapes.

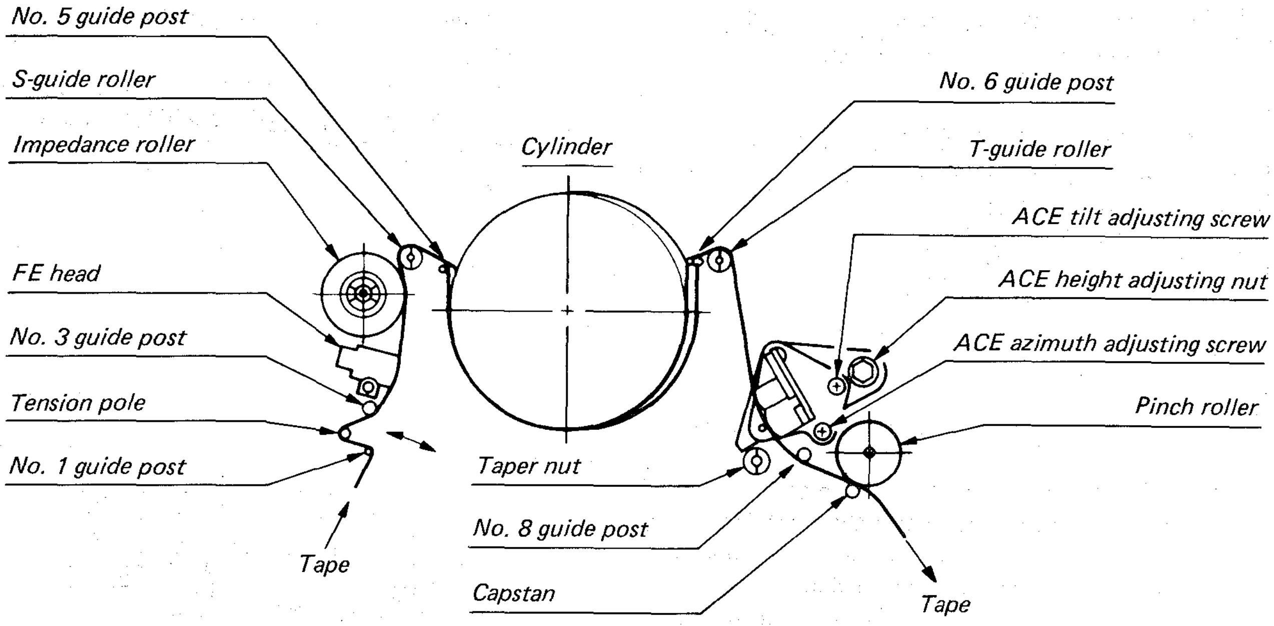

No. 5 guide post
S-guide roller
Impedance roller
FE head
No. 3 guide post
Tension pole
No. 1 guide post
Tape
Cylinder
Taper nut
No. 8 guide post
Capstan
No. 6 guide post
T-guide roller
ACE tilt adjusting screw
ACE height adjusting nut
ACE azimuth adjusting screw
Pinch roller
Tape

Fig. 2-1-3 Tape transport adjustment location

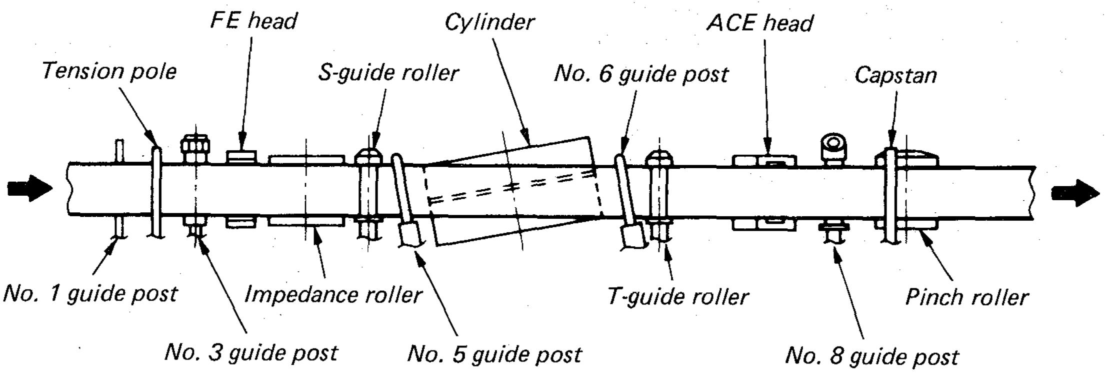

FE head
Cylinder
ACE head
Tension pole
S-guide roller
No. 6 guide post
Capstan
No. 1 guide post
Impedance roller
T-guide roller
Pinch roller
No. 3 guide post
No. 5 guide post
No. 8 guide post

Fig. 2-1-4 Tape path diagram

2-2. Cam Gear Operation

2-2-1 Cam gear and operation of each mechanism

(1) Four cams A – D are provided on one disc. (Fig. 2-2-3)

(2) These cams control the main brakes, soft brakes, pinch roller, band brakes, etc. through the logic slider, brake slider, and the pinch lock lever. (Fig. 2-2-1)

(3) The cam gear rotates the loading ring which in turn moves the S, T sliders. (Fig. 2-2-3)

(4) Fig. 2-2-3 shows shapes of the cams and position for each mode of operation.
Table 2-2-1 also shows operation modes and their timings.

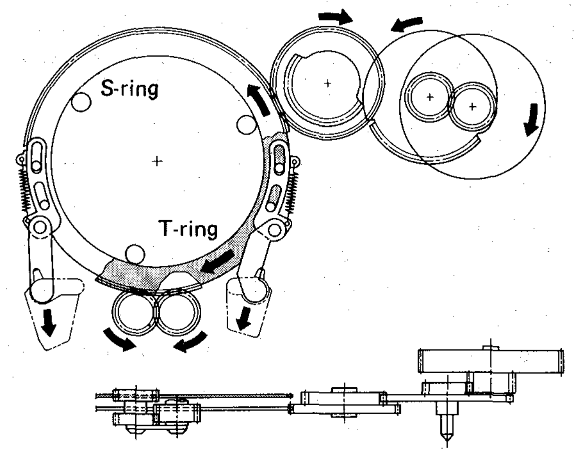

S-ring
T-ring
Cam A, B, C

Fig. 2-2-1

Table 2-2-1
Timing table for cam gear and each mode

Mode	Operation guide	Slider position	Cam position	Cam SW position
FF/REW	FF, FF Short Rewind	A	①	I
Stop	Stop, Cassette eject, Rewind short	A	②	II
Play	Play, Still, Rec, Frame	B	③	V
Cue/ Review	Cue/Review, EDIT REW	B	④	VI
Pause	Timer operation standby REC → Stop, Pause	B	⑤	VII

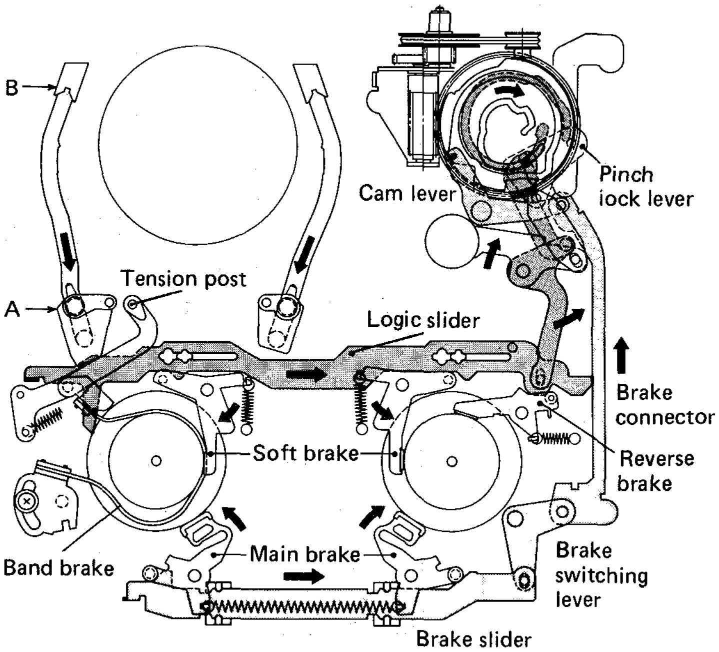
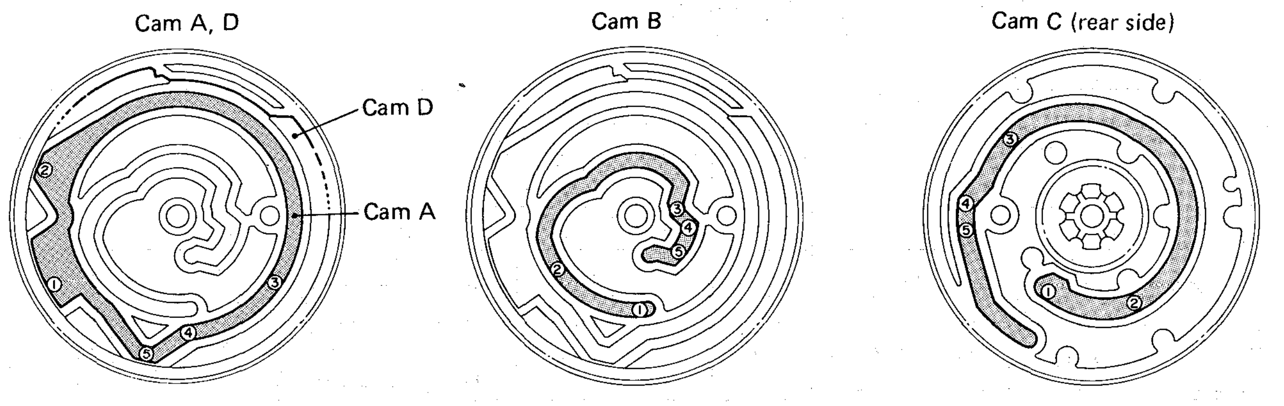

B
A
Tension post
Cam lever
Pinch lock lever
Logic slider
Brake connector
Soft brake
Reverse brake
Band brake
Main brake
Brake switching lever
Brake slider

Fig. 2-2-2


Cam A, D
Cam D
Cam A
Cam B
Cam C (rear side)
①
②
③
④
⑤

Cam A and cam D control the main brakes through cam lever, brake connector, brake switching lever and brake slider.

Cam B controls pinch roller through pinch lock lever.

Cam C controls soft brakes, band brakes and reverse brakes through logic slider.

Fig. 2-2-3

2-2-2 Cam switch drive

(1) Cam switches function to convert each mode of the mechanisms into electrical signals and transfer them to the microcomputer.

(2) The cam switches are rotated in synchronization with the cam gear by the loading motor and each mode signal is created in relation to the angle of the cam rotated.

(3) IC601 controls IC602 to drive the loading motor in forward or reverse direction for setting the cam to a desired mode position.
Fig. 2-2-4 shows forward rotation modes of the cam.

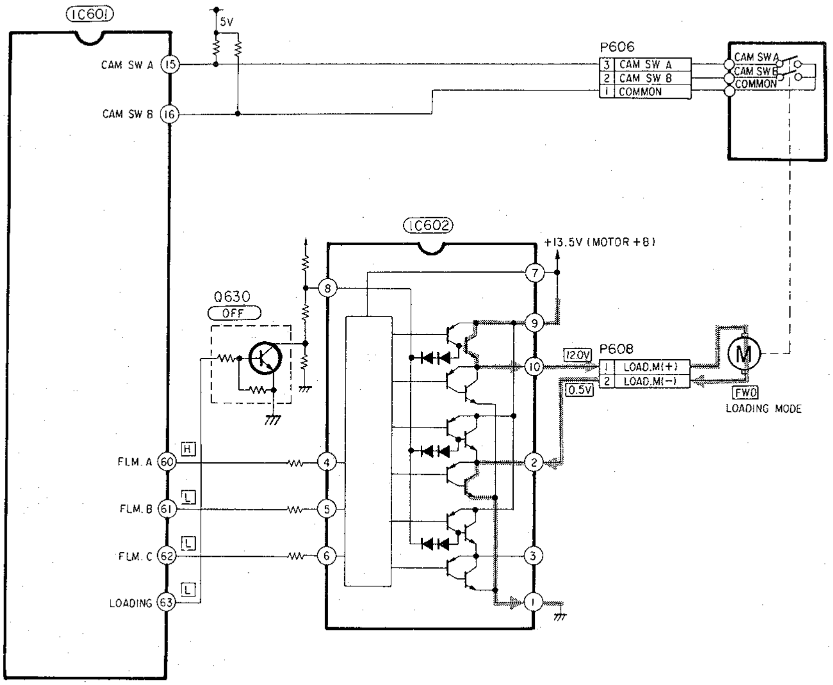

IC601
5V
CAM SW A 15
CAM SW B 16
P606
3 CAM SW A
2 CAM SW B
1 COMMON
CAM SW A
CAM SW B
COMMON
IC602
+13.5V (MOTOR +B)
Q630
OFF
7
8
9
10
2
3
1
4
5
6
12.0V
0.5V
P608
1 LOAD.M(+)
2 LOAD.M(−)
M
FWD
LOADING MODE
FLM. A 60
FLM. B 61
FLM. C 62
LOADING 63
H
L
L
L

Fig. 2-2-4 Loading motor drive (FF rotation)

Mode	IC601				Loading motor
	⑥⓪	⑥①	⑥②	⑥③	
Stop	H	H	H	L	Stop
Cam rotates forwardly (Loading)	H	L	L	L	FORWARD rotation (11.5V)
				H	FORWARD rotation (8.5V)
Cam rotate reversely (Unloading)	H	L	H	L	REVERSE rotation (11.5V)
				H	REVERSE rotation (8.5V)

2-2-3 Cam control

(1) The loading motor rotates and moves the cam gear, thus setting a mechanical mode.

(2) Cam gear positions corresponding to various modes, cam switches, and mechanical system operations are given in the cam control chart.

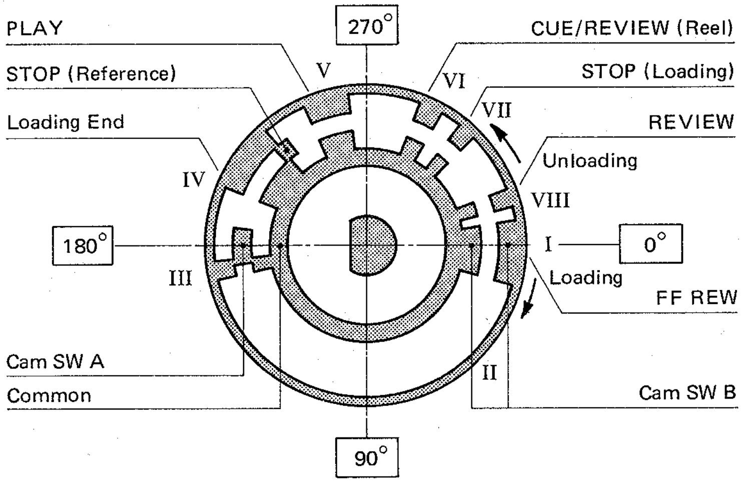

270°
PLAY
STOP (Reference)
Loading End
V
IV
180°
III
Cam SW A
Common
CUE/REVIEW (Reel)
VI
STOP (Loading)
VII
REVIEW
Unloading
VIII
I
0°
Loading
FF REW
II
Cam SW B
90°

Fig. 2-2-5 Shape of cam switch

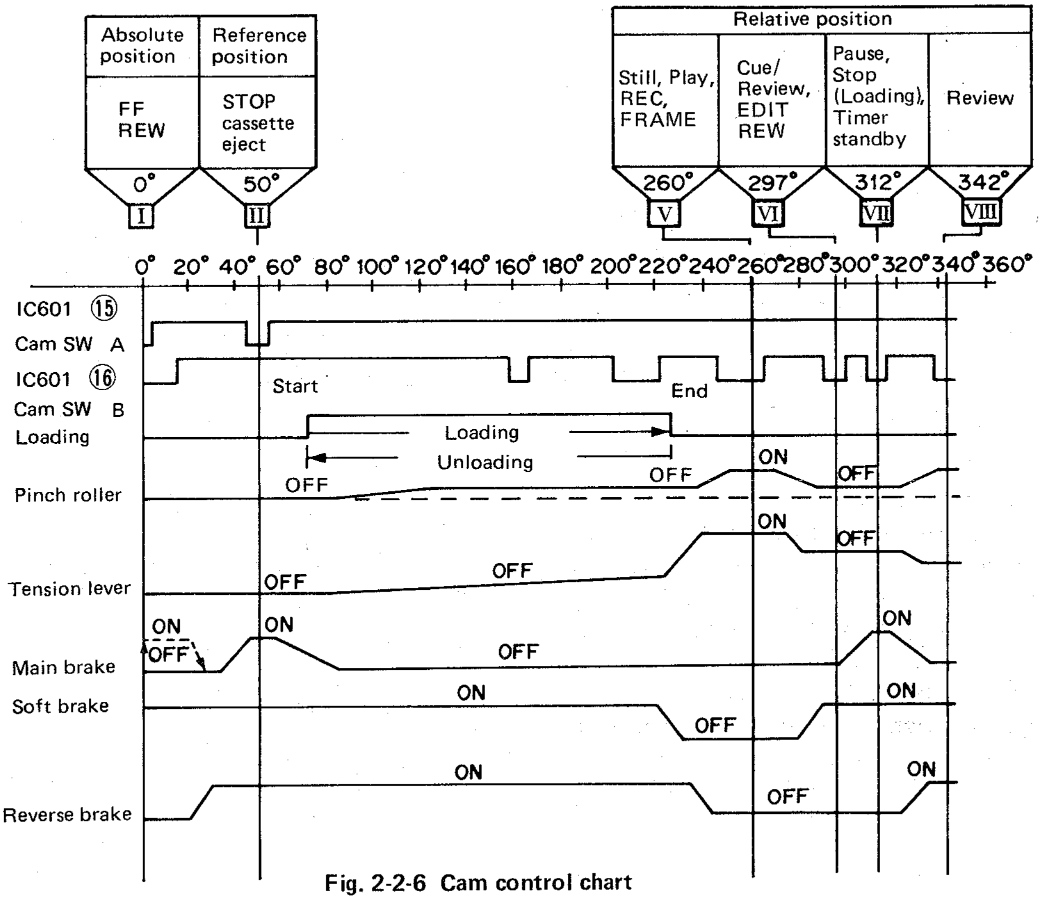


Fig. 2-2-6 Cam control chart

3. DESCRIPTION ON EACH MODE OPERATION

3-1. Front Loading

3-1-1 Slot-in operation

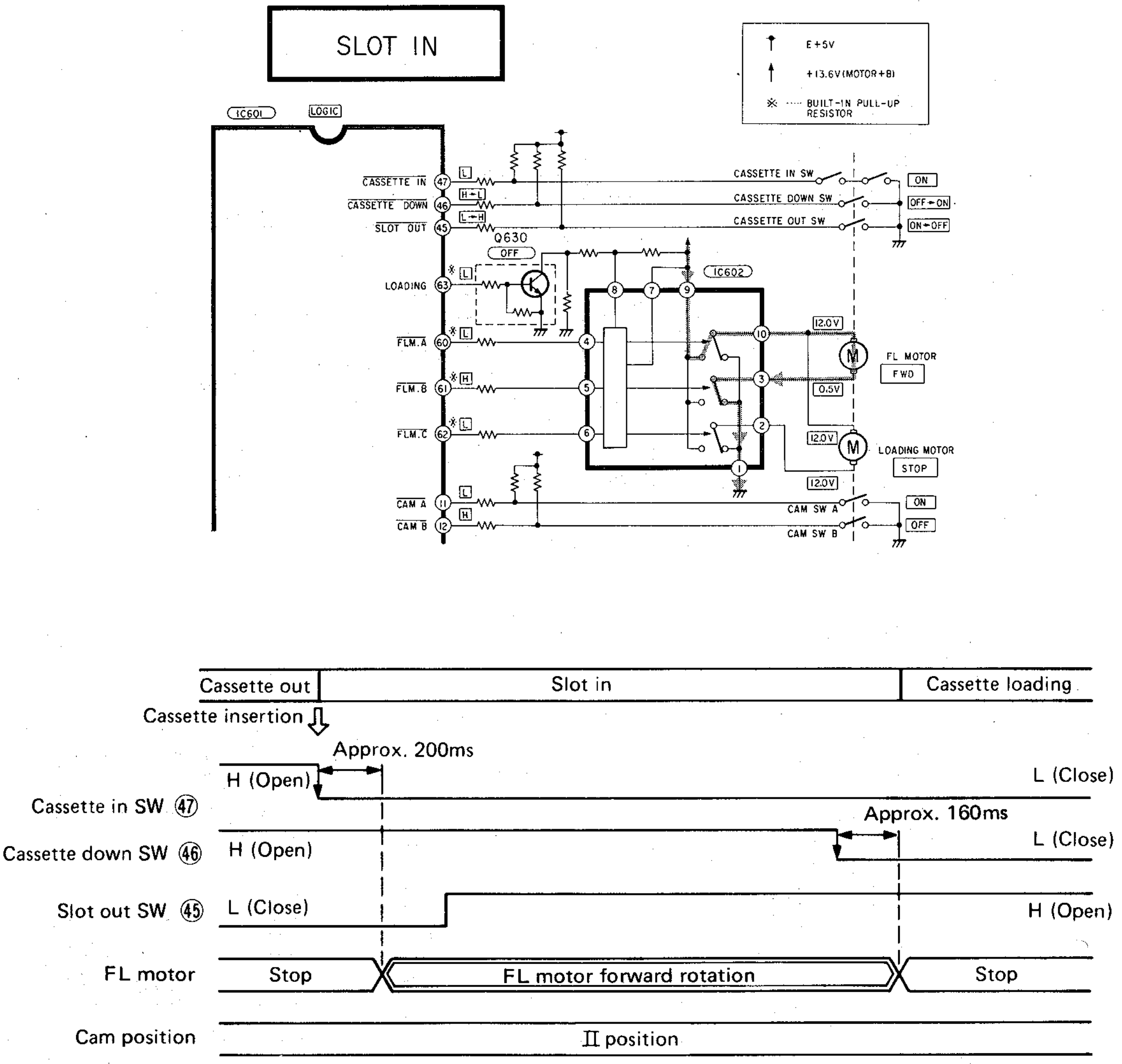

SLOT IN
E+5V
+13.6V(MOTOR+B)
※ ····· BUILT-IN PULL-UP RESISTOR
IC601
LOGIC
CASSETTE IN 47 L
CASSETTE DOWN 46 H→L
SLOT OUT 45 L→H
Q630 OFF
LOADING 63 ※L
FLM.A 60 ※L
FLM.B 61 ※H
FLM.C 62 ※L
CAM A 11 L
CAM B 12 H
IC602
8 7 9 4 5 6 10 3 2 1
CASSETTE IN SW
CASSETTE DOWN SW
CASSETTE OUT SW
ON
OFF→ON
ON→OFF
12.0V
0.5V
12.0V
12.0V
FL MOTOR
FWD
LOADING MOTOR
STOP
CAM SW A
CAM SW B
ON
OFF
Cassette out
Slot in
Cassette loading
Cassette insertion
Approx. 200ms
H (Open)
L (Close)
Cassette in SW ㊼
Approx. 160ms
Cassette down SW ㊻
H (Open)
L (Close)
Slot out SW ㊺
L (Close)
H (Open)
FL motor
Stop
FL motor forward rotation
Stop
Cam position
II position

Fig. 3-1-1 Slot in operation

(1) When a cassette is loaded into the cassette holder, two cassette detection switches mounted under the cassette holder are pressed by the bottom case of the cassette and closed. (IC601 controls IC602 to rotate the FL motor in forward direction.) (Fig. 3-1-2)

(2) The motor rotates in direction shown by the arrow (clockwise direction viewed from front side) with the two left and right cassette detection switches in operation.

The rotational force of the motor is transferred to the arm gear L through the coupling, worm gear, worm wheel, arm gear R and the left and right drive gears, and the arm gear L moves the cassette holder horizontally. (Refer to Fig. 3-1-3)

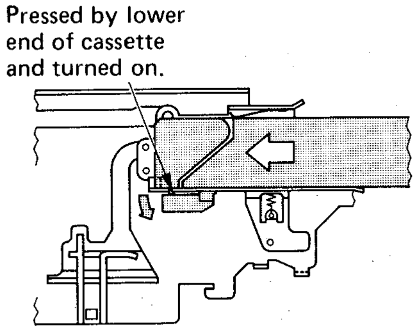

Pressed by lower end of cassette and turned on.

Fig. 3-1-2

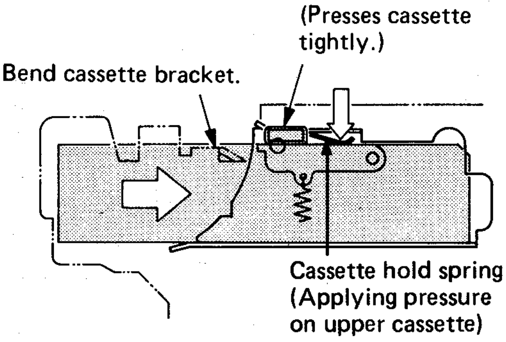

(Presses cassette tightly.)
Bend cassette bracket.
Cassette hold spring (Applying pressure on upper cassette)

Fig. 3-1-4

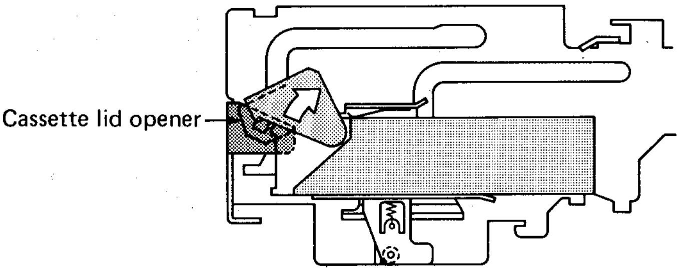

Cassette lid opener

Fig. 3-1-5

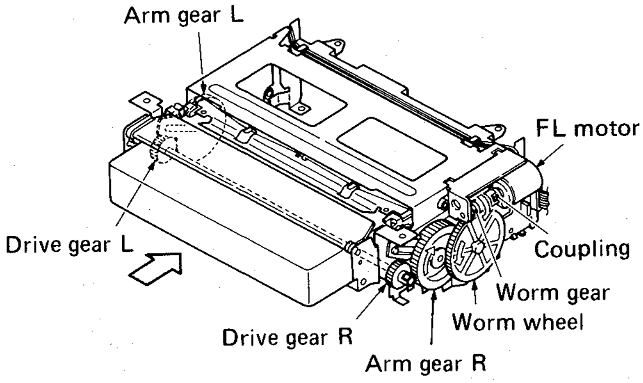

Arm gear L
FL motor
Drive gear L
Coupling
Worm gear
Worm wheel
Drive gear R
Arm gear R

Fig. 3-1-3

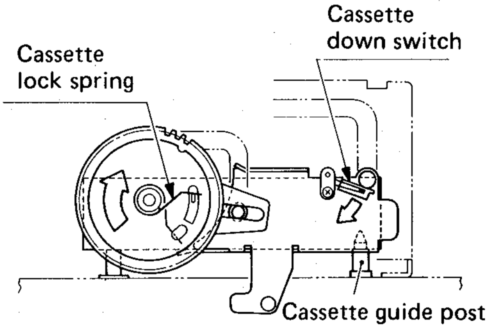

Cassette down switch
Cassette lock spring
Cassette guide post

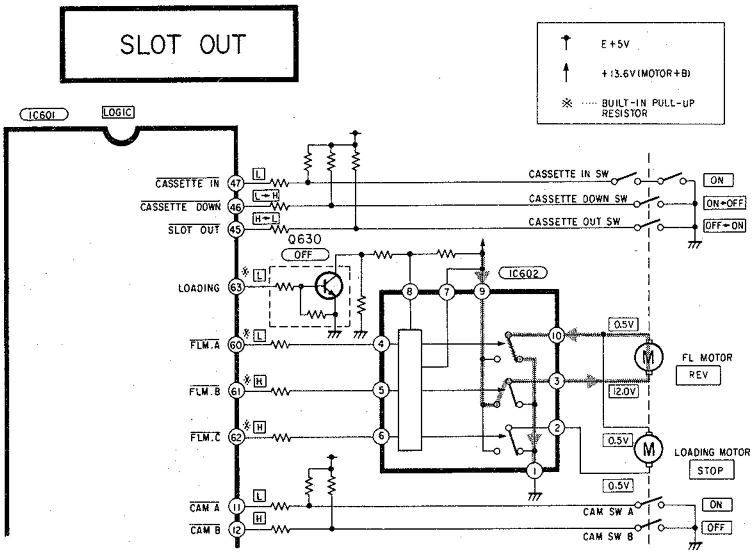
Fig. 3-1-6

(3) The cassette loaded in the cassette holder is, first, held in a place by two cassette hold springs (strip) provided on left and right sides of the holder reenforcement plates, thus preventing the cassette from its positional deviation at the starting period.
Motion of the cassette holder unlatches both left and right cassette levers from their hooks provided on the guide bracket and allows the cassette to rotate in the direction being pressed, thus holding the cassette more tightly and preventing positional deviation of the cassette due to the cassette lid opener. (Fig. 3-1-4)

(4) In the last stage of the cassette holder's horizontal motion, the cassette lid is engaged with the cassette opener and opened widely as the cassette holder moves down.

(5) When the cassette is mounted on the cassette guide posts, the cassette down switch turns on.
The slot motor continues to rotate for approx. 160 msec after the above operation and the cassette is pressed by the left and right cassette lock springs and stopped. (Fig. 3-1-6)

3-1-2 Slot-out operation


SLOT OUT
E +5V
+13.6V (MOTOR+B)
※ ····· BUILT-IN PULL-UP RESISTOR
IC601
LOGIC
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
47
46
45
63
60
61
62
11
12
L
L→H
H→L
※ L
※ L
※ H
※ H
L
H
Q630
OFF
IC602
8
7
9
4
5
6
10
3
2
1
CASSETTE IN SW
CASSETTE DOWN SW
CASSETTE OUT SW
ON
ON→OFF
OFF→ON
0.5V
12.0V
0.5V
0.5V
FL MOTOR
REV
LOADING MOTOR
STOP
CAM SW A
CAM SW B
ON
OFF

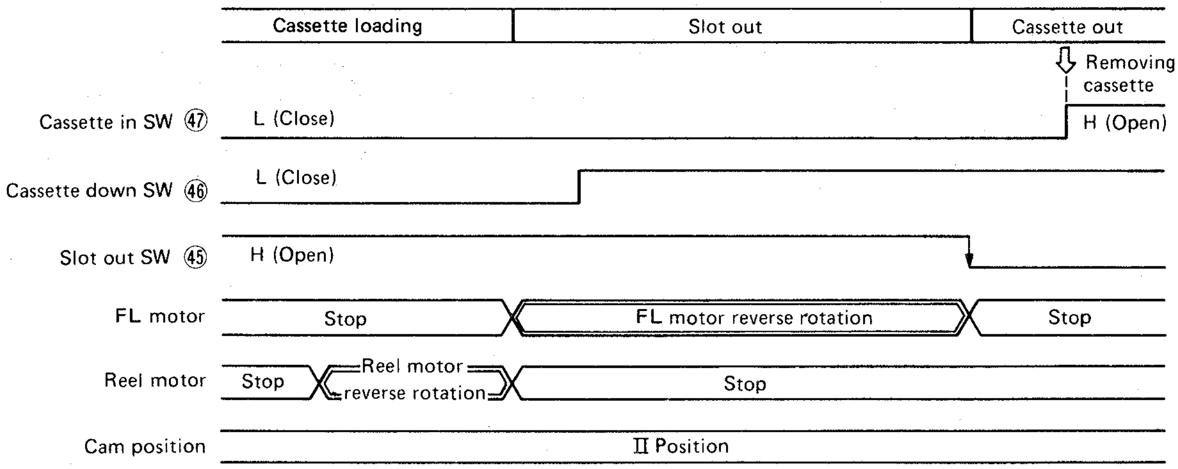

Cassette loading
Slot out
Cassette out
Removing cassette
Cassette in SW ㊼
L (Close)
H (Open)
Cassette down SW ㊻
L (Close)
Slot out SW ㊺
H (Open)
FL motor
Stop
FL motor reverse rotation
Stop
Reel motor
Stop
Reel motor reverse rotation
Stop
Cam position
II Position

Fig. 3-1-7 Slot out operation

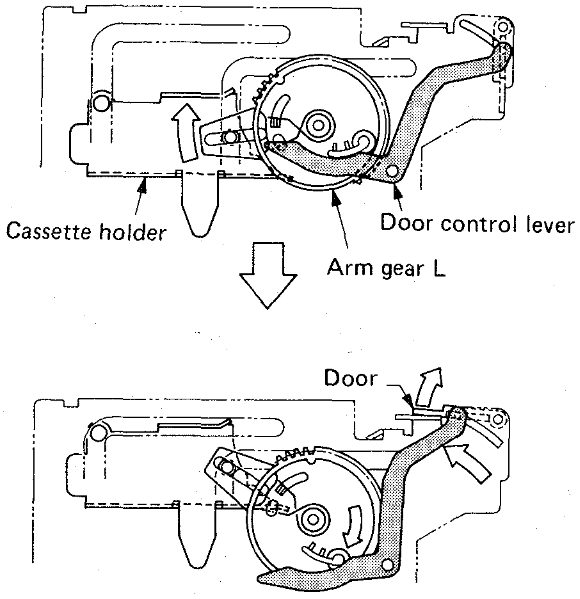


Fig. 3-1-8

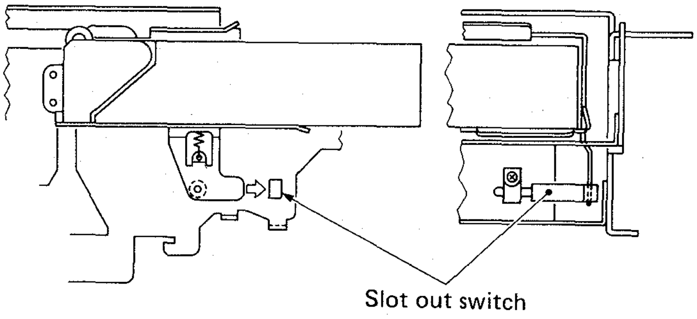


Fig. 3-1-9

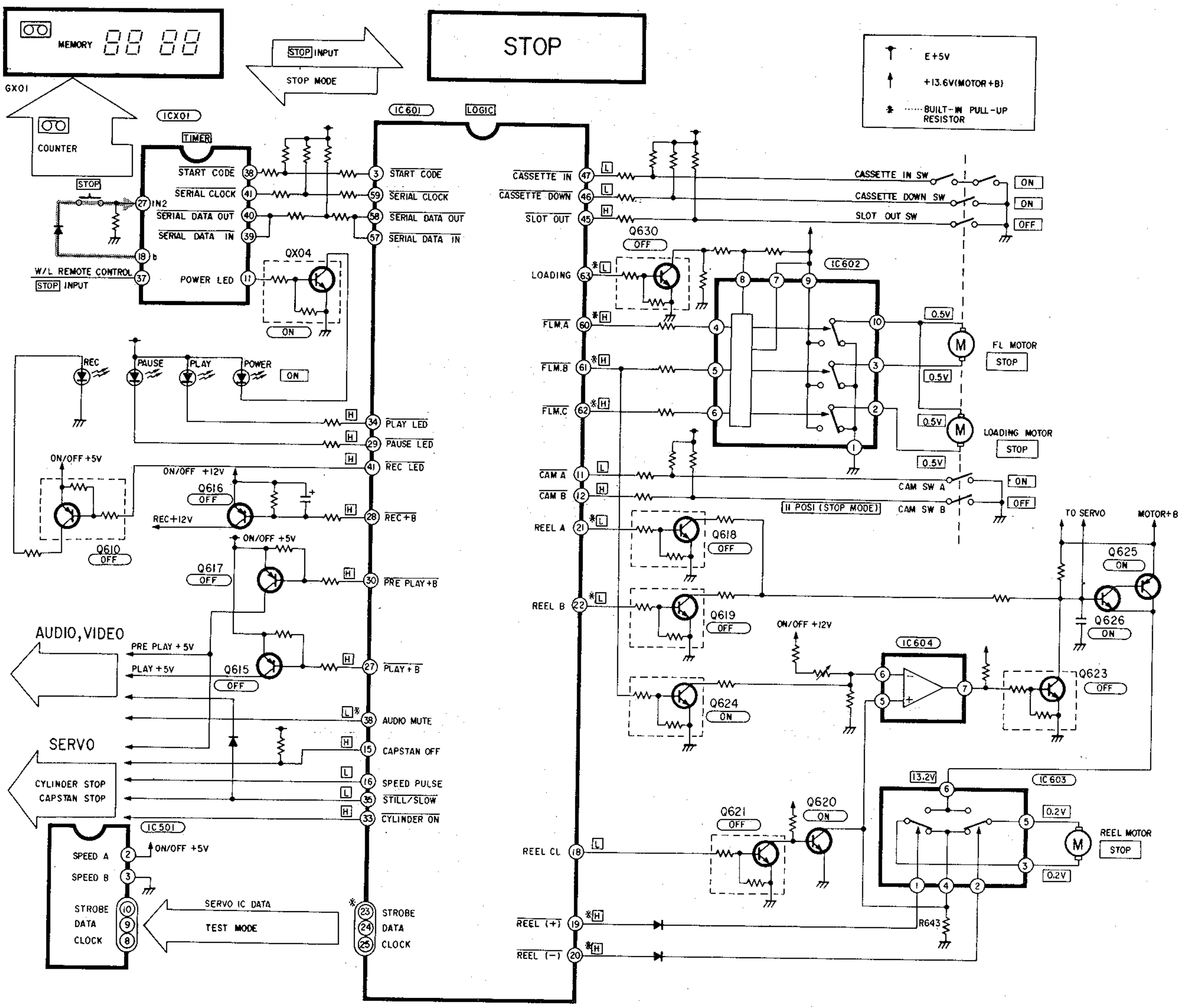
(1) The loading motor rotates and sets the cam gear to the stop mode (position II) and actuates the main brakes for the reel tables.

(2) IC601 controls IC603 so that the reel motor rotates in opposite direction for approx. 1 sec to remove tape slack. Then, IC601 also controls IC603 and rotates the FL motor in reverse direction.

(3) While the cassette holder is moving upward, the door control lever rotatively moves along the cam surface of the arm gear and the door opens. (Fig. 3-1-8)

(4) The cassette holder horizontally moves and reaches close to the stop position, the slot-out switch is turned on by the lower end of the cassette holder. (Fig. 3-1-9)

3-2. Stop Mode



MEMORY 88 88
GX01
COUNTER
STOP INPUT
STOP MODE
STOP
IC601
LOGIC
IC X01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN2
W/L REMOTE CONTROL
STOP INPUT
POWER LED
QX04
ON
REC
PAUSE
PLAY
POWER
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
ON/OFF +5V
ON/OFF +12V
REC+12V
Q610 OFF
Q616 OFF
Q617 OFF
Q615 OFF
AUDIO,VIDEO
PRE PLAY + 5V
PLAY +5V
SERVO
CYLINDER STOP
CAPSTAN STOP
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
TEST MODE
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
ON
ON
OFF
Q630 OFF
IC602
0.5V
FL MOTOR STOP
LOADING MOTOR STOP
CAM SW A
CAM SW B
II POSI (STOP MODE)
Q618 OFF
Q619 OFF
Q624 ON
ON/OFF +12V
IC604
TO SERVO
MOTOR+B
Q625 ON
Q626 ON
Q623 OFF
Q621 OFF
Q620 ON
IC603
13.2V
0.2V
REEL MOTOR STOP
R643

Fig. 3-2-1

(1) The cam gear is in the stop mode (position II). Under this condition, the cylinder motor, capstan motor, and the reel motor are also stopped.

(2) Each part of the mechanism is set as follows:

1 The T- and S- sliders are set in unloading condition.

2 The pinch roller is away from the capstan.

3 The tension lever is stored on the reel table side. That is, the band brake is released and the back tension is released.

4 The T- and S-main brakes, T- and S-soft brakes and the reverse brakes are being actuated.

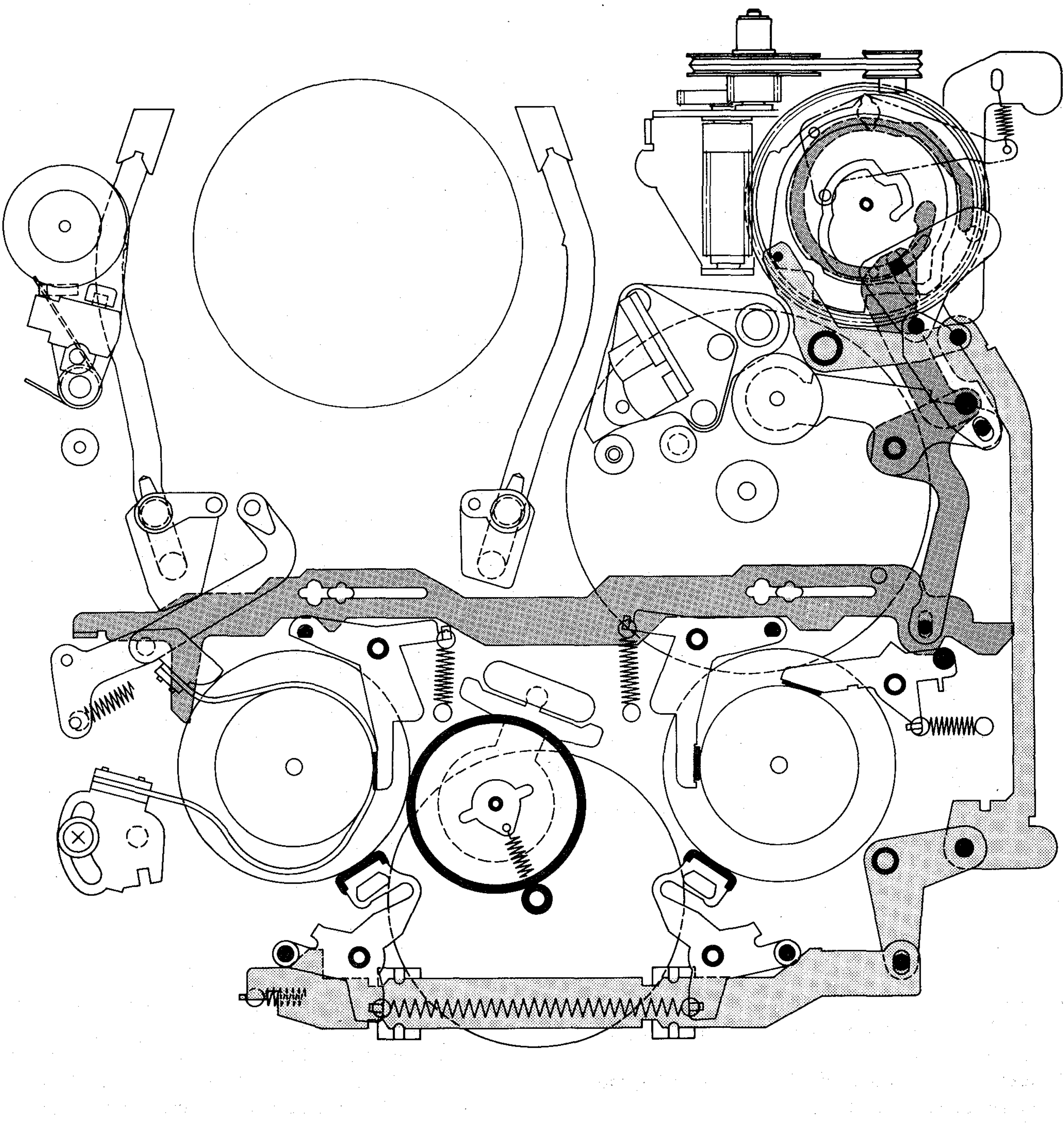


Fig. 3-2-2

3-3. FF/REW Mode (From Stop Mode)

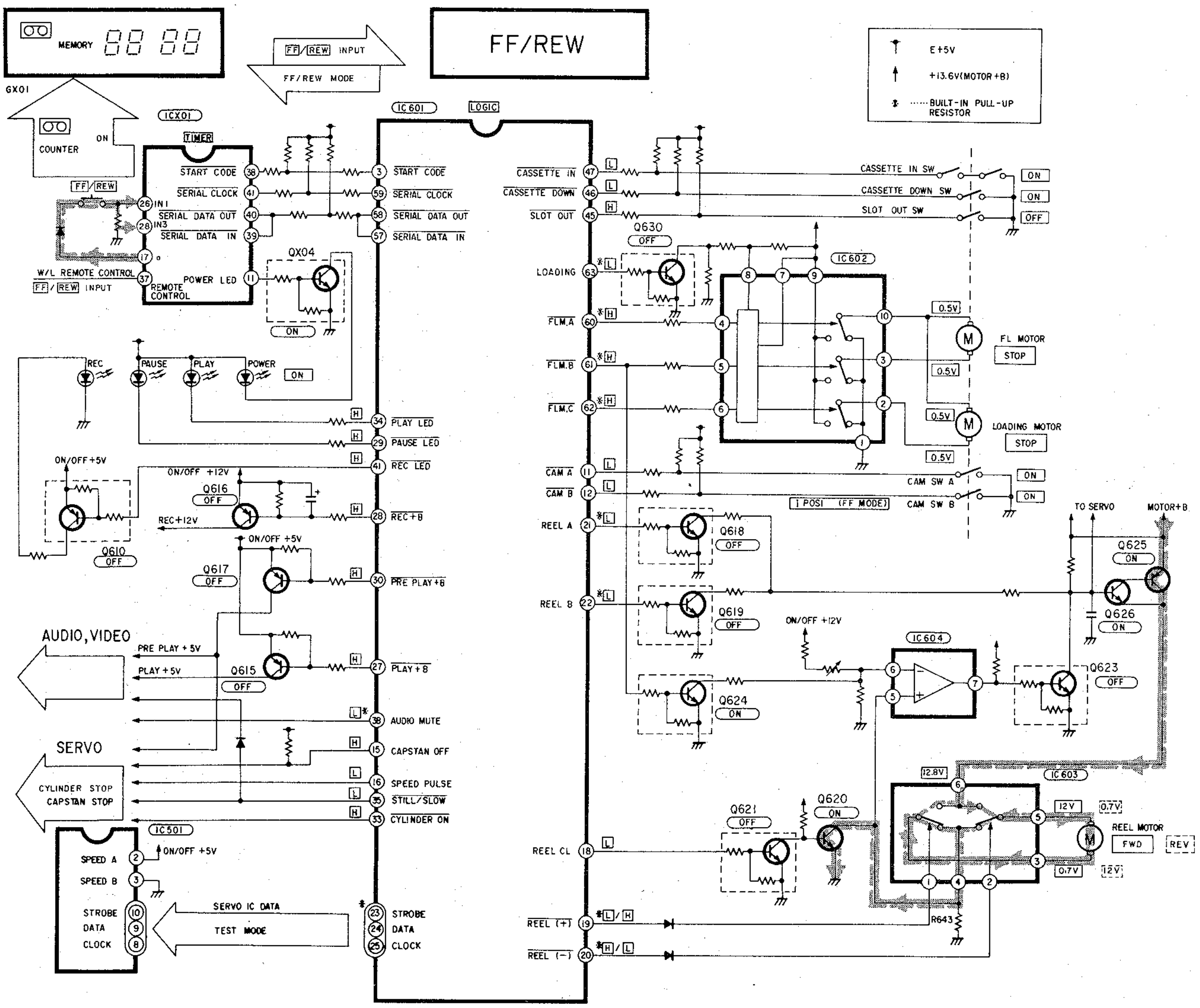

MEMORY 88 88
GX01
COUNTER
ON
FF/REW INPUT
FF/REW MODE
FF/REW
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
ICX01
TIMER
IC601
LOGIC
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN1
IN3
W/L REMOTE CONTROL
FF/REW INPUT
REMOTE CONTROL
POWER LED
QX04
ON
REC
PAUSE
PLAY
POWER
ON/OFF+5V
ON/OFF +12V
Q616
OFF
REC+12V
Q610
OFF
Q617
OFF
ON/OFF +5V
AUDIO, VIDEO
PRE PLAY + 5V
PLAY + 5V
Q615
OFF
SERVO
CYLINDER STOP
CAPSTAN STOP
IC501
ON/OFF +5V
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
TEST MODE
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
STROBE
DATA
CLOCK
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
ON
ON
OFF
Q630
OFF
IC602
0.5V
FL MOTOR
STOP
0.5V
0.5V
LOADING MOTOR
STOP
0.5V
CAM SW A
CAM SW B
ON
ON
I POSI (FF MODE)
Q618
OFF
Q619
OFF
Q624
ON
ON/OFF +12V
IC604
TO SERVO
MOTOR+B
Q625
ON
Q626
ON
Q623
OFF
12.8V
IC603
12V
0.7V
0.7V
12V
REEL MOTOR
FWD
REV
Q621
OFF
Q620
ON
R643

Fig. 3-3-1

(1) When the FF button is pushed in the stop mode, ICX01 transfers the FF input signal serially to IC601 to set the FF mode.

(2) IC601 controls IC602 and rotates the loading motor in reverse direction. (direction ①)

(3) The cam gear rotates (②–⑥), the brake slider starts to move and releases the T- and S-main brakes (⑦–⑭).

The logic slider also moves and releases the reverse brakes. (⑮ – ㉒)

(4) When the cam gear is set to the FF mode (position I), the loading motor stops.

IC601 controls IC603 which in turn drives the reel motor with a constant voltage. Then the idler contacts the T-reel table and transfers rotational force, thus winding the tape.

(5) In the REW mode, the reel motor rotates in reverse direction, and the idler contacts the S-reel table, thus rewinding the tape.

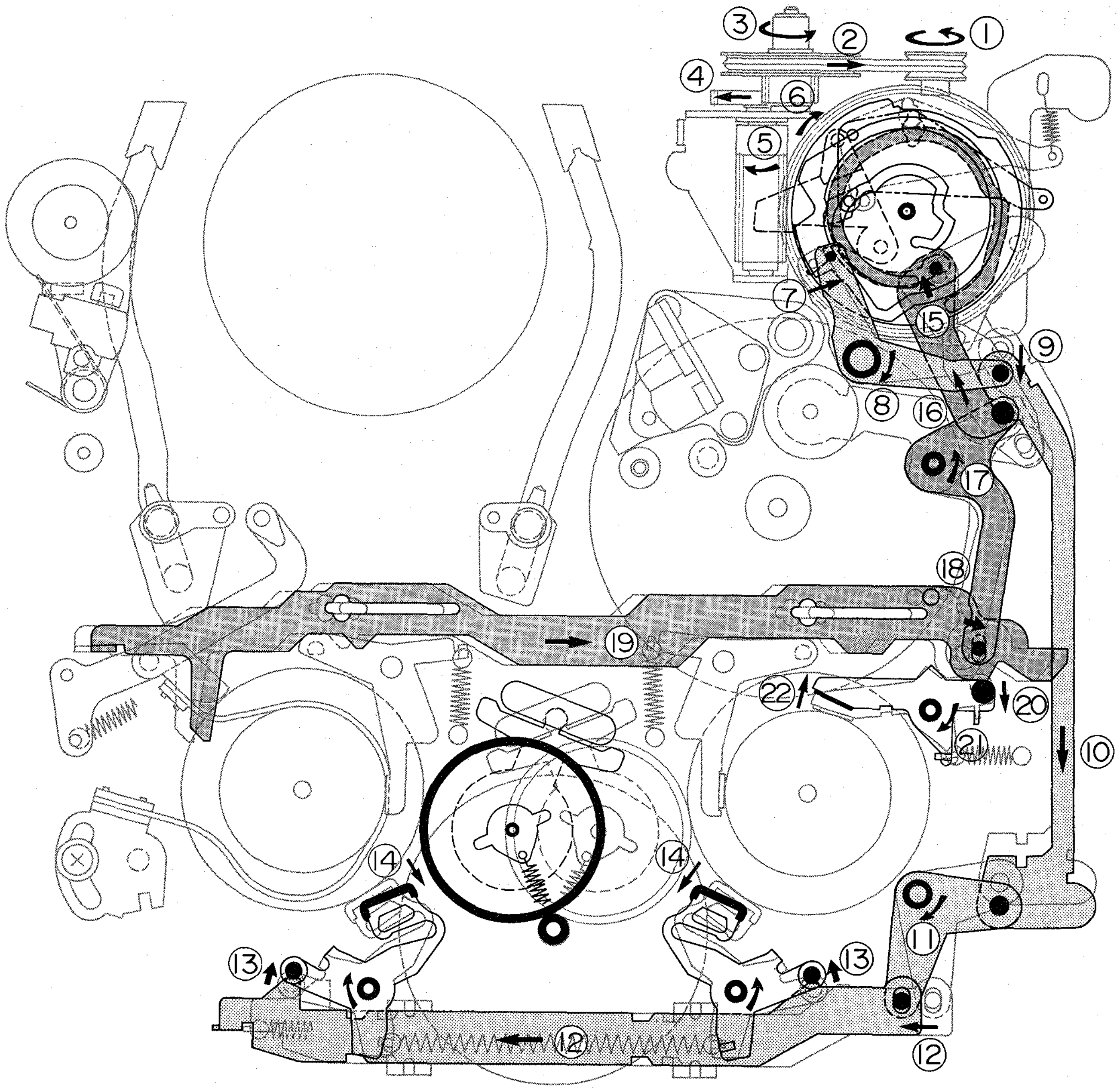

③
②
①
④
⑥
⑤
⑦
⑮
⑨
⑧
⑯
⑰
⑱
⑲
㉒
⑳
㉑
⑩
⑭
⑭
⑪
⑬
⑬
⑫
⑫

Fig. 3-3-2

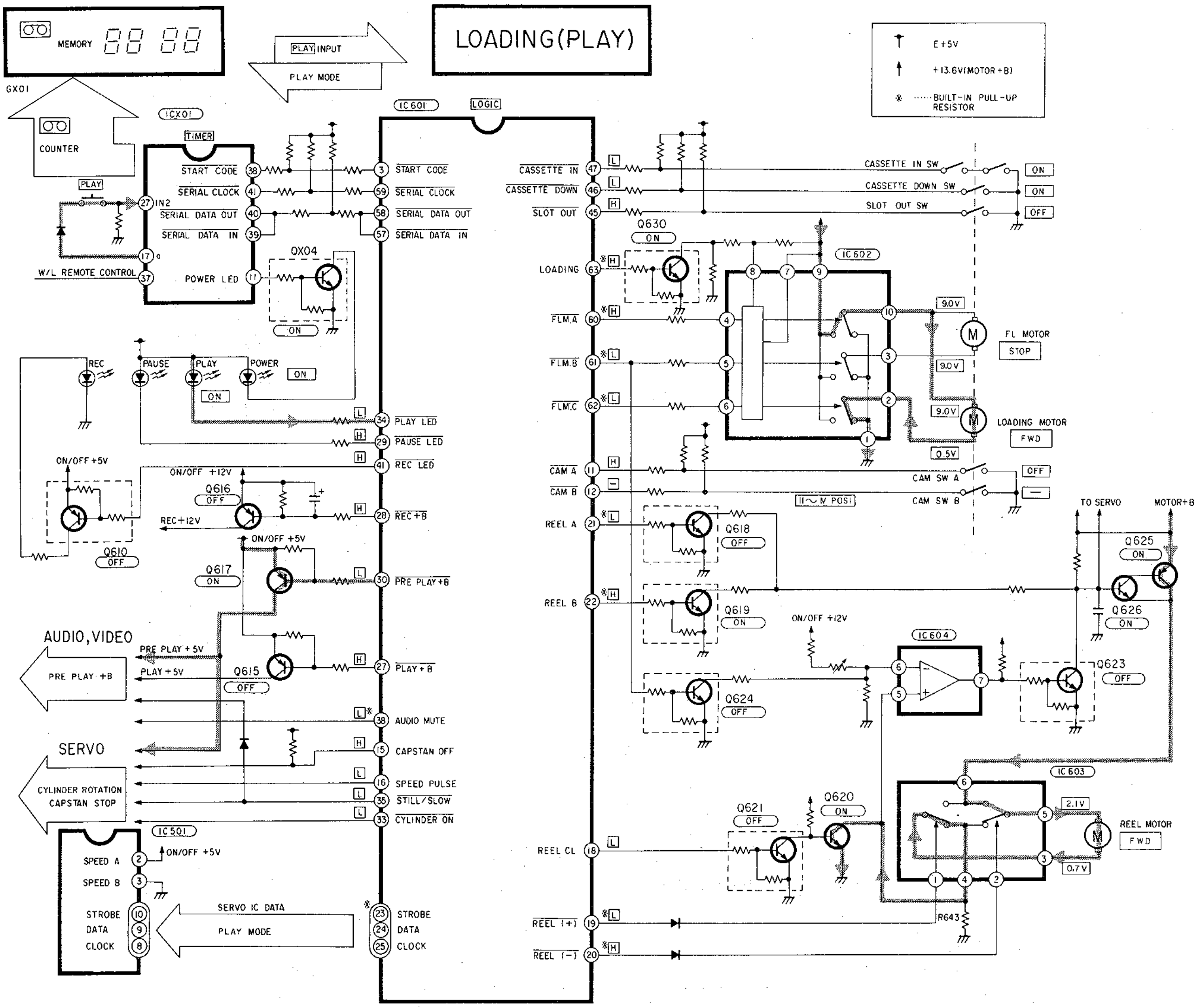
(6) The cylinder motor and the capstan motor are in stop condition.

Note: Operation from FF/REW mode to STOP mode

- When the loading motor rotates in forward direction, the lock lever actuates and the T- and S-main brakes are immediately actuated.

3-4. Playback System Mode

3-4-1 Loading mode



MEMORY
GX01
COUNTER
ICX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN2
W/L REMOTE CONTROL
POWER LED
QX04
PLAY INPUT
PLAY MODE
LOADING(PLAY)
IC601
LOGIC
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
CASSETTE IN
CASSETTE DOWN
SLOT OUT
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
LOADING
Q630
IC602
FLM.A
FLM.B
FLM.C
FL MOTOR
STOP
LOADING MOTOR
FWD
CAM A
CAM B
CAM SW A
CAM SW B
II~IV POSI
REEL A
REEL B
Q618
Q619
Q624
IC604
Q623
Q625
Q626
TO SERVO
MOTOR+B
REC
PAUSE
PLAY
POWER
PLAY LED
PAUSE LED
REC LED
ON/OFF +5V
ON/OFF +12V
Q616
REC+12V
REC+B
Q610
Q617
PRE PLAY+B
AUDIO,VIDEO
PRE PLAY +5V
PLAY +5V
PRE PLAY +B
Q615
PLAY+B
AUDIO MUTE
SERVO
CAPSTAN OFF
CYLINDER ROTATION
CAPSTAN STOP
SPEED PULSE
STILL/SLOW
CYLINDER ON
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
PLAY MODE
REEL CL
Q621
Q620
IC603
REEL MOTOR
REEL (+)
REEL (−)
R643
ON/OFF +12V

Fig. 3-4-1

(1) When the PLAY button is pushed in the stop mode, ICX01 serially transfers the playback input signal to IC601 to set the playback mode.

(2) IC601 and IC603 make the reel motor rotate in forward direction and the idler moves toward the T-reel table side. After that, the output at pin ㉒ turns to "H" level and this makes Q619 on, keeping the motor terminal voltage at approx. 1.5V so that the T-reel table does not rotate in reverse direction. (Since the reverse brake is actuated, no tape is wound.)

(3) Next, the loading motor rotates in forward direction. At the same time the cam gear rotates. (① – ⑥). Then the brake slider moves and releases the T- and S-main brakes. (⑦ – ⑭)

(4) When the loading motor rotates in forward direction, the loading ring and the loading gear make the T- and S-sliders move along the loading guide. (⑮)
In the loading mode (position II – IV), pin (63) of IC601 goes "H" level, and this sets the motor terminal voltage to 8.5V, thus controlling moving speed of the T- and S-sliders.
When the cam gear exceeds the position II, the cylinder motor starts to run.
At the same time, the tension lever also moves toward the No. 1 guide.
Furthermore, the pinch lock lever moves and the pinch roller moves toward the capstan side. (⑯ – ⑱)

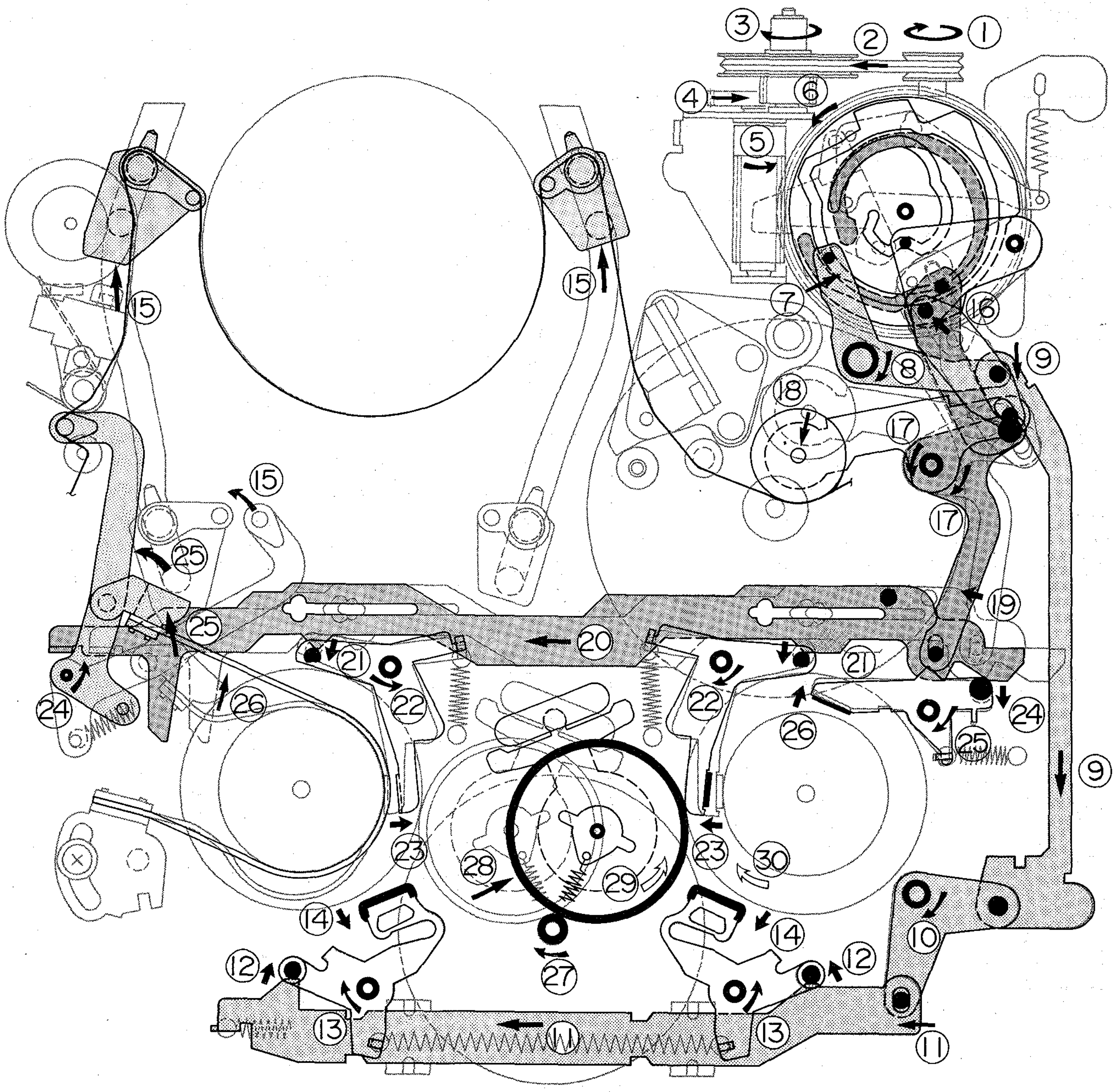


Fig. 3-4-2

(5) When the cam gear reaches the position IV, pin (63) of IC601 develops "L" level, and the terminal voltage of the loading motor rises to approx. 11.5V. Then, the T- and S-sliders are fixed to the cylinder base.

At the same time, the logic slider moves, the T- and S-soft brakes are released, (⑲ – ㉓), and the reverse brake is also released, (㉔ – ㉖).

The tension lever moves, furthermore, toward the No. 1 guide side, the band brake actuates, and the back tension mechanism functions.

(6) The pinch roller engages with the capstan with a specified pressure. (⑯ – ⑱)

(7) When the cam gear exceeds the playback mode (position V), the loading motor rotates in reverse direction and when the cam returns to the position V the motor stops.

3-4-2 Playback mode

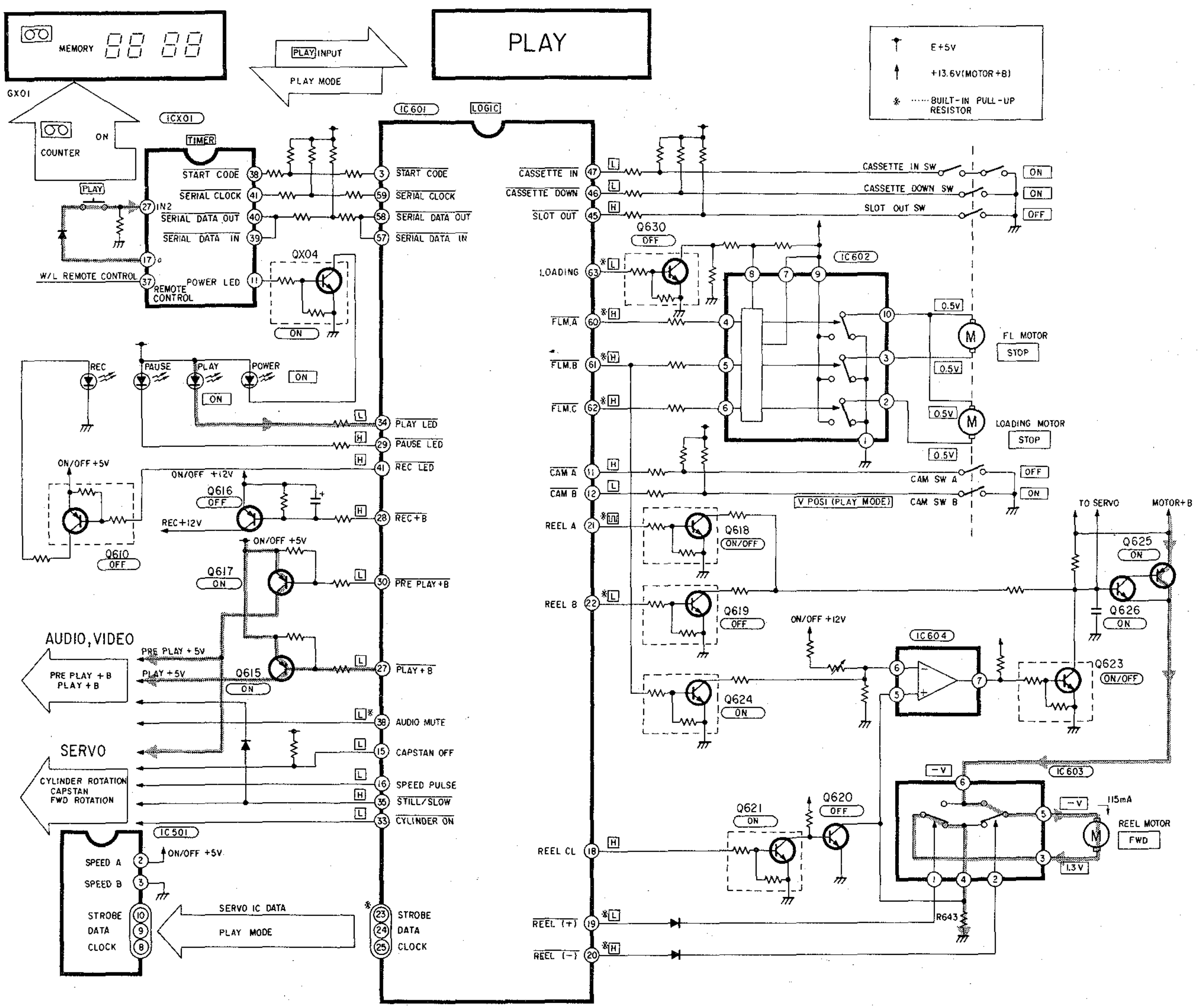

MEMORY
GX01
COUNTER
ON
PLAY INPUT
PLAY MODE
PLAY
IC601
LOGIC
ICX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN2
W/L REMOTE CONTROL
REMOTE CONTROL
POWER LED
QX04
ON
REC
PAUSE
PLAY
POWER
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
Q610
OFF
ON/OFF +5V
Q617
ON
AUDIO,VIDEO
PRE PLAY + 5V
PLAY +5V
PRE PLAY +B
PLAY +B
Q615
ON
SERVO
CYLINDER ROTATION
CAPSTAN
FWD ROTATION
IC501
ON/OFF +5V
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
PLAY MODE
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
ON
ON
OFF
Q630
OFF
IC602
0.5V
FL MOTOR
STOP
LOADING MOTOR
STOP
CAM SW A
CAM SW B
V POSI (PLAY MODE)
OFF
ON
TO SERVO
MOTOR+B
Q618
ON/OFF
Q619
OFF
ON/OFF +12V
Q625
ON
Q626
ON
IC604
Q623
ON/OFF
Q624
ON
IC603
Q621
ON
Q620
OFF
115mA
REEL MOTOR
FWD
1.3V
R643

Fig. 3-4-3

(1) When the loading operation completes, pin ⑮ of IC601 develops "L" level output.

(2) IC601 controls IC603 and makes the reel motor rotate in forward direction. The idler touches the T-reel table and transfers rotational force to wind the tape. (㉗ – ㉘)

(3) Under this condition, pin ⑱ of IC601 develops "H" level and Q620 turns off.

Feedback voltage across R643 (by reel current) and a reference voltage at pin ⑥ of IC604 are compared, and if a current higher than the specified flows, Q623 is turned on to lower the base potential of Q626, thus limiting the current to a constant value of approx. 85 mA or driving the tape with a constant torque.

(4) Pin ㉗ of IC601 turns to "L" level and Q615 turns on, connecting the playback +5V to the audio and video circuits to set the playback mode.

3-4-3 Unloading

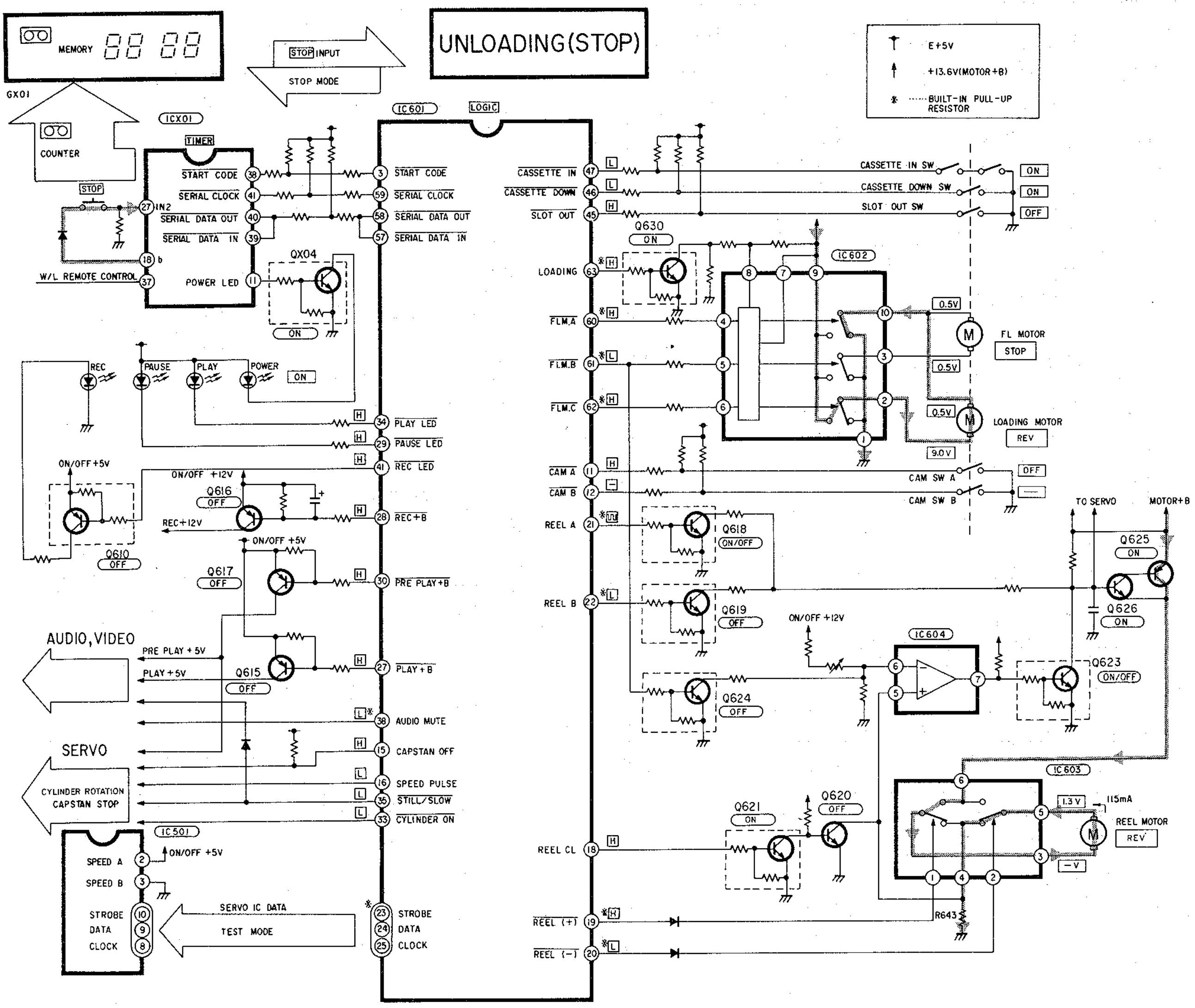

UNLOADING(STOP)
MEMORY
GX01
COUNTER
STOP INPUT
STOP MODE
ICX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN2
STOP
W/L REMOTE CONTROL
POWER LED
QX04
ON
IC601
LOGIC
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
CASSETTE IN
CASSETTE DOWN
SLOT OUT
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
ON
ON
OFF
Q630
ON
LOADING
IC602
FLM.A
FLM.B
FLM.C
0.5V
0.5V
0.5V
FL MOTOR
STOP
LOADING MOTOR
REV
9.0V
CAM A
CAM B
CAM SW A
CAM SW B
OFF
TO SERVO
MOTOR+B
REEL A
Q618
ON/OFF
REEL B
Q619
OFF
ON/OFF +12V
Q625
ON
Q626
ON
IC604
Q623
ON/OFF
Q624
OFF
REC
PAUSE
PLAY
POWER
ON
PLAY LED
PAUSE LED
REC LED
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
REC+B
Q610
OFF
ON/OFF +5V
Q617
OFF
PRE PLAY+B
AUDIO,VIDEO
PRE PLAY + 5V
PLAY+5V
Q615
OFF
PLAY+B
AUDIO MUTE
SERVO
CAPSTAN OFF
CYLINDER ROTATION
CAPSTAN STOP
SPEED PULSE
STILL/SLOW
CYLINDER ON
IC501
ON/OFF +5V
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
TEST MODE
STROBE
DATA
CLOCK
IC603
Q621
ON
Q620
OFF
REEL CL
1.3V
115mA
REEL MOTOR
REV
-V
REEL (+)
REEL (-)
R643

Fig. 3-4-4

(1) When the STOP button is pushed in the playback mode, ICX01 sets IC601 to the stop mode.

(2) The cam gear is in the playback mode (position V).

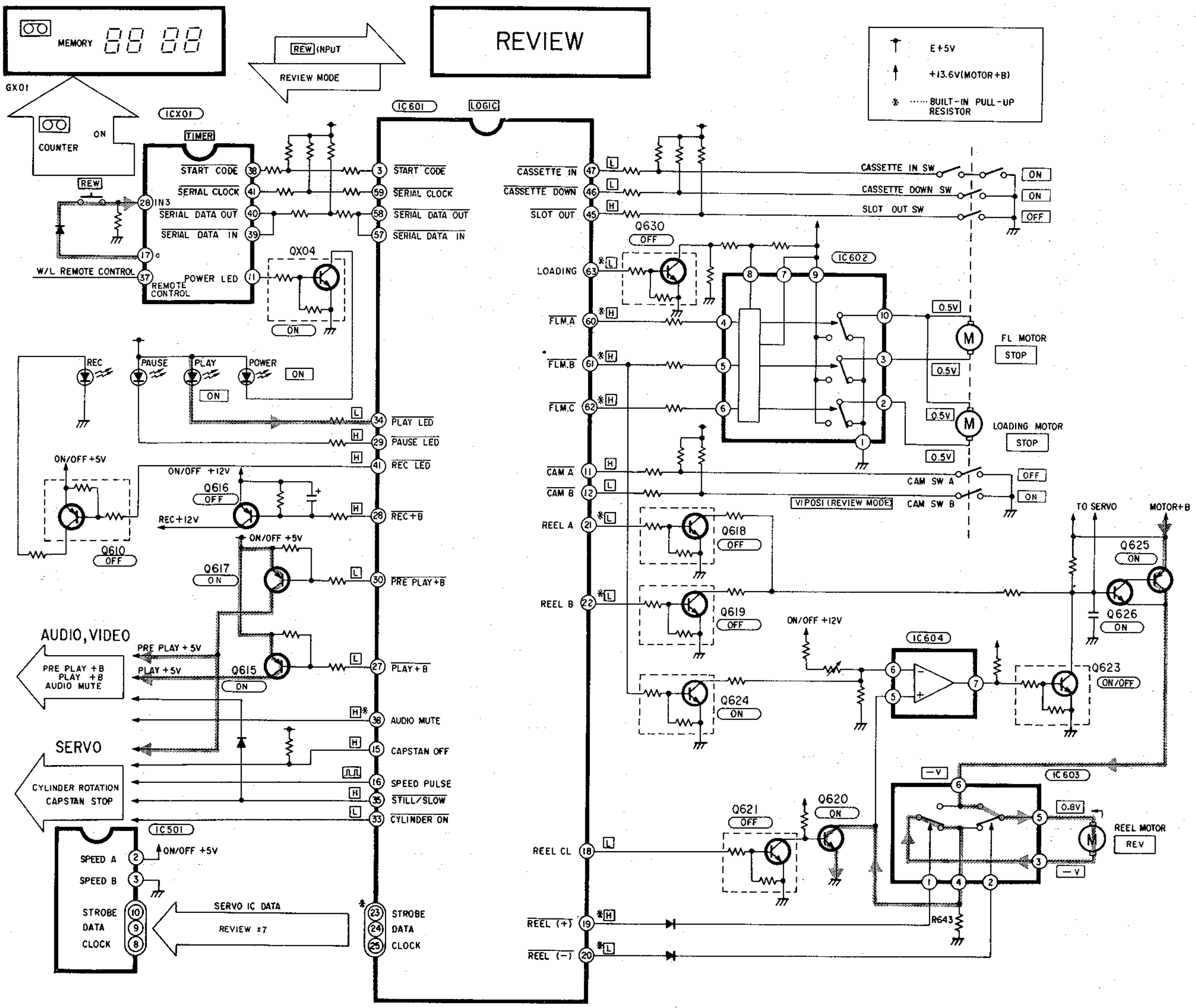
(3) The cylinder motor rotates and the capstan motor stops. At the same time the reel motor also stops.

(4) The loading motor rotates reversely and the cam moves from the position V to the position II.
Under this condition, mechanical parts move in reverse order of the loading operation.

(5) When the cam gear reaches the position V, pin (63) of IC601 develops "H" level signal and controls the moving speed of the T- and S-sliders.
The reel motor rotates in reverse direction and makes the idler move toward the S-reel table.
As stated in 3-4-2 (3), the reel current flowing through R643 is fed back to pin ⑤ of IC604 to drive the tape with a constant current of approx. 110 mA.

(6) When the cam gear reaches the position II, the cylinder motor, loading motor and the reel motor stop.

3-4-4 Review mode



MEMORY 88 88
GX01
COUNTER
ON
REW
REVIEW
REW INPUT
REVIEW MODE
IC601
LOGIC
ICX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN3
W/L REMOTE CONTROL
REMOTE CONTROL
POWER LED
QX04
REC
PAUSE
PLAY
POWER
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
Q610
OFF
Q617
ON
Q615
ON
AUDIO, VIDEO
PRE PLAY + 5V
PLAY + 5V
PRE PLAY +B
PLAY +B
AUDIO MUTE
SERVO
CYLINDER ROTATION
CAPSTAN STOP
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
REVIEW ×7
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
Q630
IC602
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
0.5V
FL MOTOR
STOP
LOADING MOTOR
CAM SW A
CAM SW B
VIPOSI (REVIEW MODE)
Q618
Q619
Q624
Q620
Q621
Q623
ON/OFF
Q625
Q626
IC604
IC603
ON/OFF +12V
TO SERVO
MOTOR+B
0.8V
REEL MOTOR
REV
R643
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR

Fig. 3-4-5

(1) When the REW button is pushed in the playback mode, IC601 is set to the review mode.

(2) Pin ㊳ of IC601 develops "H" level and mutes audio signals.
In this case, the cylinder motor rotates but the capstan motor stops.

(3) The reel motor is driven at a constant voltage in forward direction and the idler transfers rotational force to the T-reel table, thus winding the tape.

(4) The loading motor rotates in forward direction (direction ①) and the cam moves from the position V to the position VII. In this case, the cam gear rotates forwardly (① – ⑥) and the pinch roller moves away from the capstan. (⑦ – ⑨)
The logic slider also moves S-soft brake is applied, and the tension lever moves away from No. 1 guide. (⑩ – ⑯)
Furthermore, the brake slider moves, and T- and S-main brakes operate.

(5) Then the cam gear reaches the position VII, the loading motor stops and the reel motor rotates reversely.
In this case, the idler moves toward the S-reel table to wind the tape so that the tape does not slip off the cylinder.

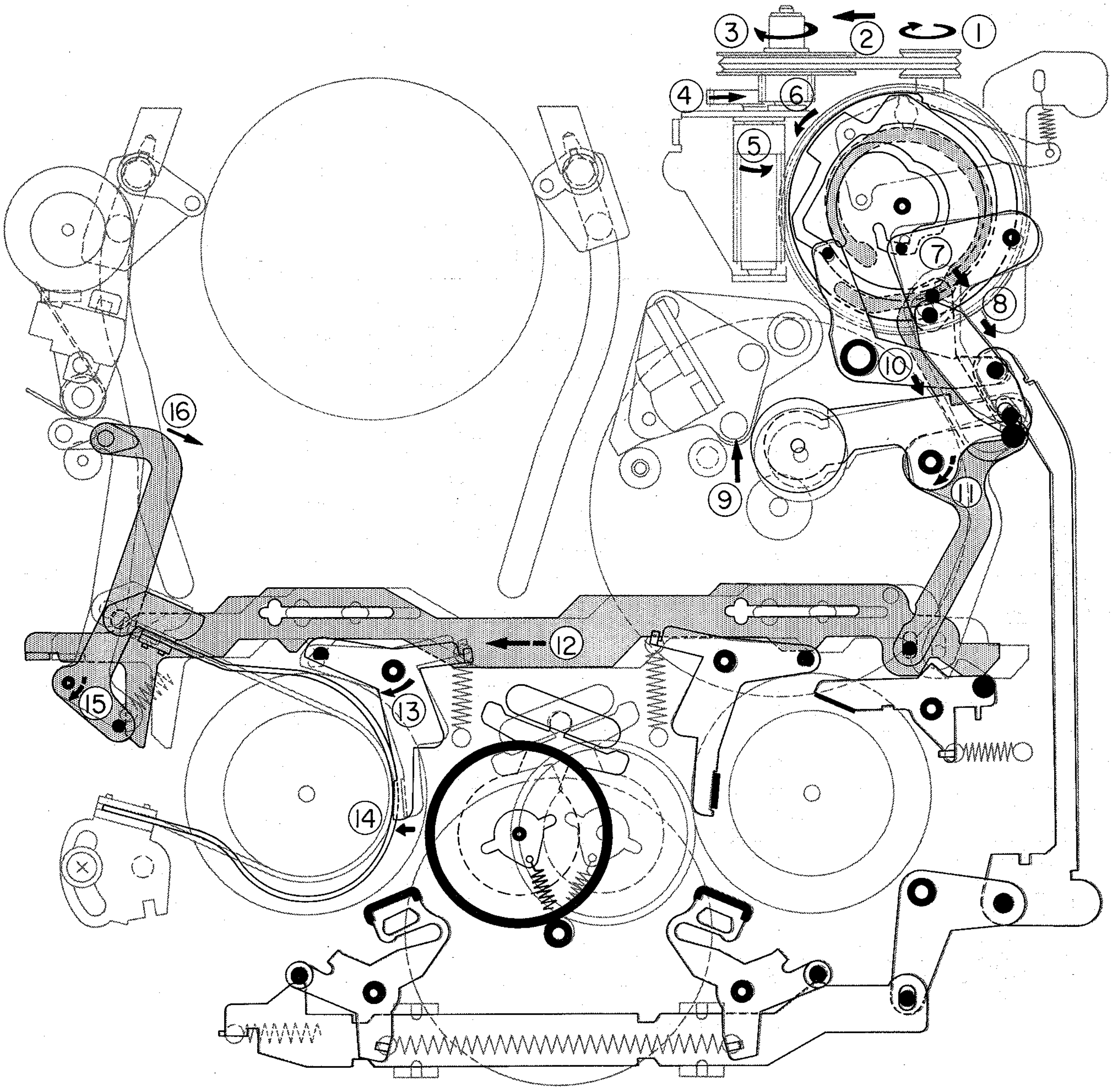


Fig. 3-4-6

(6) Next, the loading motor rotates in reverse direction and the cam moves from position VII to VI.
In this case the cam gear rotates, the brake slider moves and the T- and S-main brake is released.

(7) When the cam gear reaches the review mode (position VI), the loading motor stops.

(8) The reel motor also rotates reversely and the idler transfers the rotational force to the S-reel table and the reel winds the tape.
At the same time, the servo circuit controls the CTL pulse so that the reel motor rotates at the speed 7 times higher than the normal speed.

3-4-5 Still mode

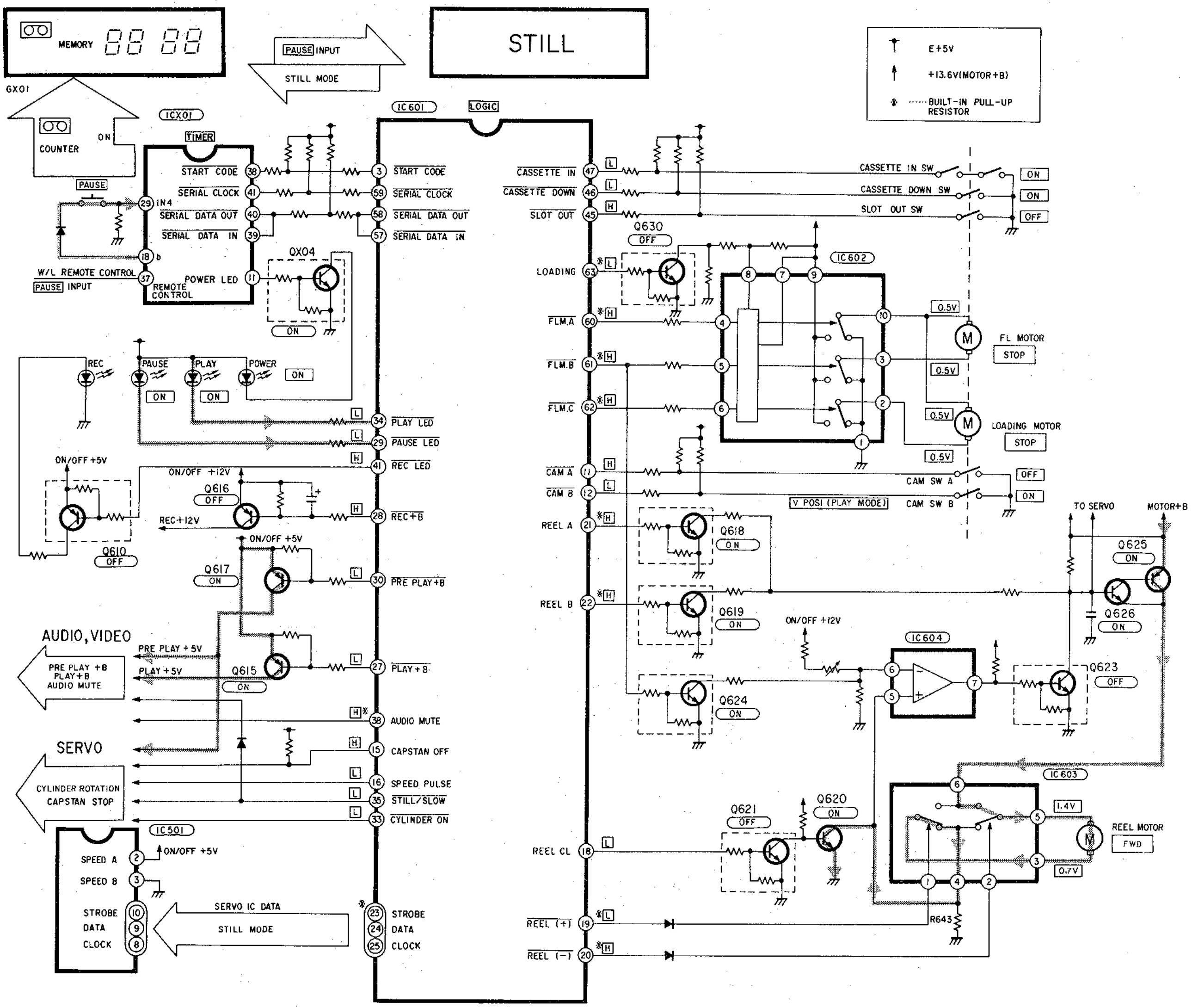

MEMORY 88 88
GX01
COUNTER
ON
PAUSE INPUT
STILL MODE
STILL
IC601
LOGIC
IC X01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN4
PAUSE
W/L REMOTE CONTROL
PAUSE INPUT
REMOTE CONTROL
POWER LED
QX04
ON
REC
PAUSE
PLAY
POWER
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
Q610
Q617
Q615
AUDIO,VIDEO
PRE PLAY +B
PLAY+B
AUDIO MUTE
PRE PLAY +5V
PLAY +5V
SERVO
CYLINDER ROTATION
CAPSTAN STOP
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
STILL MODE
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
Q630
IC602
Q618
Q619
Q624
ON/OFF +12V
IC604
Q623
Q621
Q620
IC603
R643
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
0.5V
FL MOTOR
STOP
LOADING MOTOR
CAM SW A
CAM SW B
V POSI (PLAY MODE)
TO SERVO
MOTOR+B
Q625
Q626
1.4V
0.7V
REEL MOTOR
FWD

Fig. 3-4-7

(1) When the PAUSE button is pushed during the playback mode, IC601 is set to the still mode.

(2) The cam gear is in the playback mode (position V) and the cylinder motor is rotating.
Under this condition each pin of IC601 develops output voltages as shown in Fig. 3-4-7.

(3) Pin ㊳ of IC601 develops "H" level and mutes audio signals.

(4) A mode data (still) is sent to IC501.

(5) The capstan motor is stopped.

(6) The reel motor is driven at a constant voltage and the idler transfers rotational force to the T-reel table, thus winding the tape.
Under this condition a voltage of approx. 0.7V is applied to the motor terminals to prevent tape slack.

3-4-6 Frame feeding mode

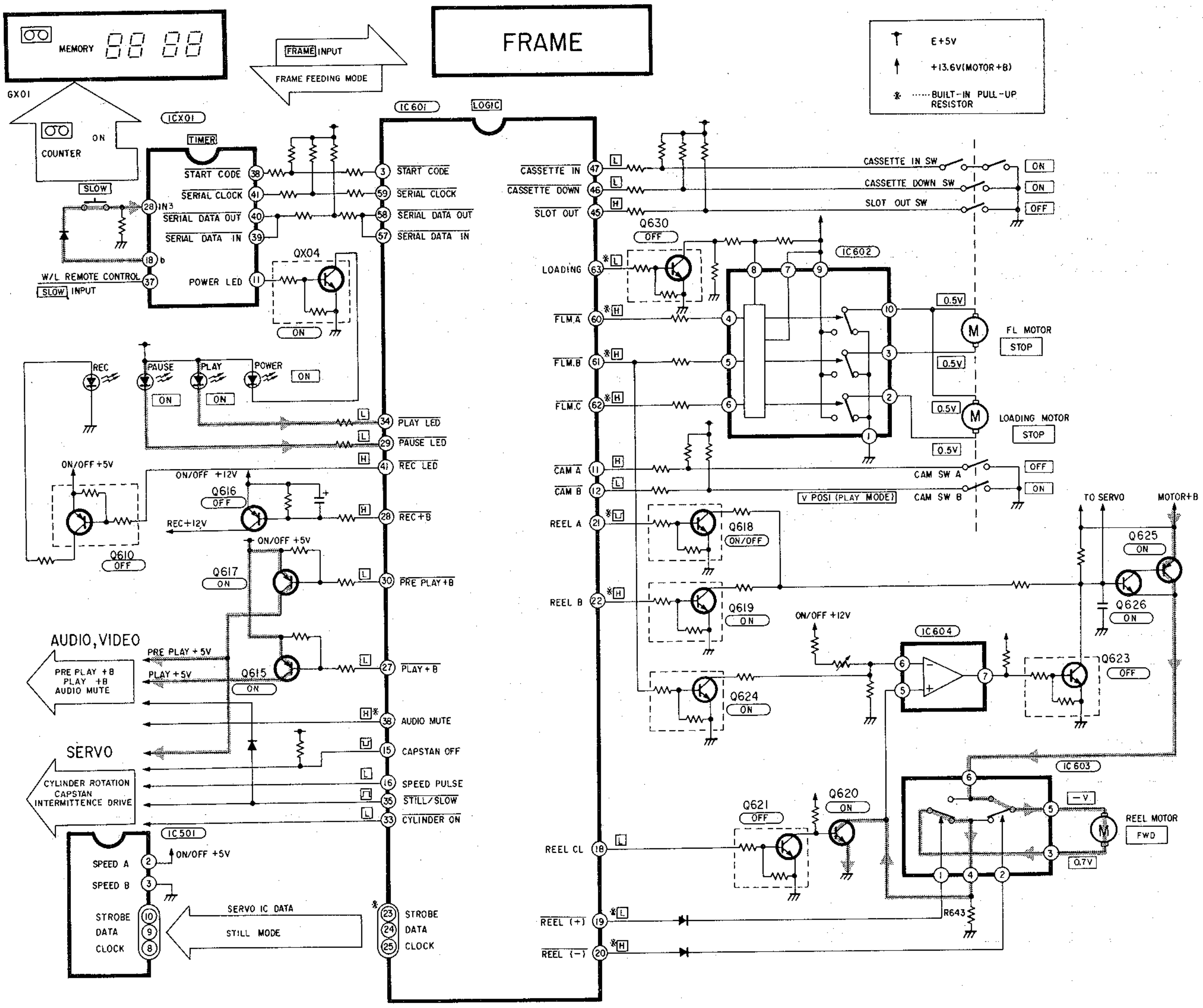

MEMORY
GX01
COUNTER
ON
SLOW
FRAME INPUT
FRAME FEEDING MODE
FRAME
IC601
LOGIC
ICX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
POWER LED
W/L REMOTE CONTROL
SLOW INPUT
QX04
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
CASSETTE IN
CASSETTE DOWN
SLOT OUT
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
OFF
LOADING
Q630
IC602
FLM.A
FLM.B
FLM.C
FL MOTOR
STOP
LOADING MOTOR
0.5V
CAM A
CAM B
CAM SW A
CAM SW B
V POSI (PLAY MODE)
REEL A
REEL B
Q618
ON/OFF
Q619
Q624
TO SERVO
MOTOR+B
Q625
Q626
IC604
Q623
ON/OFF +12V
IC603
REEL MOTOR
FWD
-V
0.7V
REEL CL
Q621
Q620
R643
REEL (+)
REEL (-)
REC
PAUSE
PLAY
POWER
PLAY LED
PAUSE LED
REC LED
ON/OFF +5V
Q616
REC+12V
REC+B
Q610
Q617
PRE PLAY+B
AUDIO, VIDEO
PRE PLAY +5V
PLAY +5V
Q615
PRE PLAY +B
PLAY +B
AUDIO MUTE
PLAY+B
SERVO
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CYLINDER ROTATION
CAPSTAN INTERMITTENCE DRIVE
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
STILL MODE

Fig. 3-4-8

(1) When the FRAME button is pushed during the still operation, the capstan motor and the reel motor rotate. When the FRAME button is pushed, the capstan motor and the reel motor are intermittently driven. (Refer to Fig. 3-4-9)

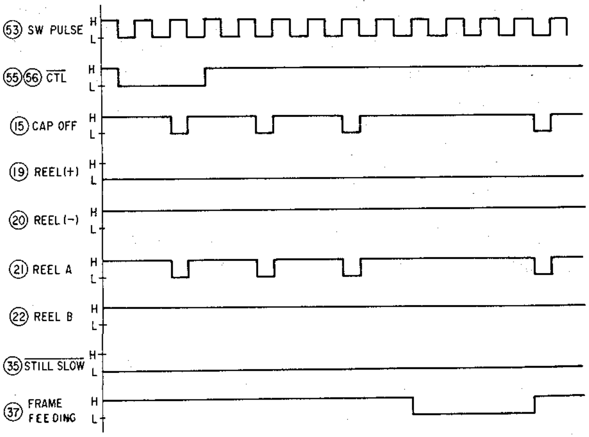


Fig. 3-4-9 Basic timing chart

3-4-7 Cue mode

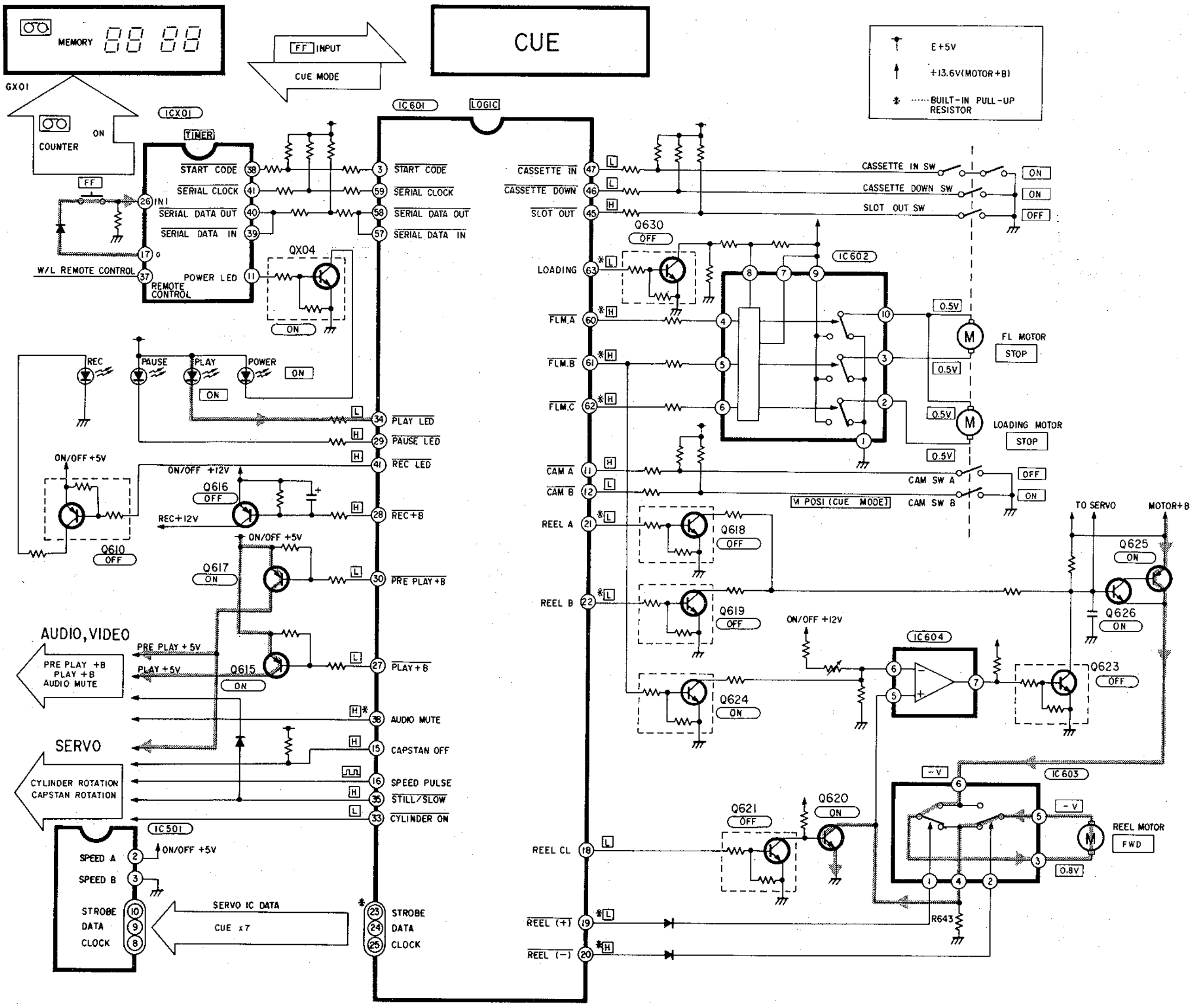


Fig. 3-4-10

(1) When the FF button is pushed during the playback mode, IC601 is set to the cue (FF playback) mode.
(2) The loading motor rotates in forward direction and the cam moves from the position V to the position VI.
(3) Pin outputs of IC601 in the cue mode are shown in Fig. 3-4-10.
(4) Pin ㊳ of IC601 develops "H" level and mutes audio signals.
(5) A mode data is sent to IC501.
(6) The reel motor rotates in forward direction and the idler transfers rotational force to the T-reel table to wind the tape.
At the same time, the servo circuit controls the CTL pulse so that the reel motor rotates at the speed 7 times higher than the normal speed.

3-5. Record System Mode

3-5-1 Record mode (from stop mode)

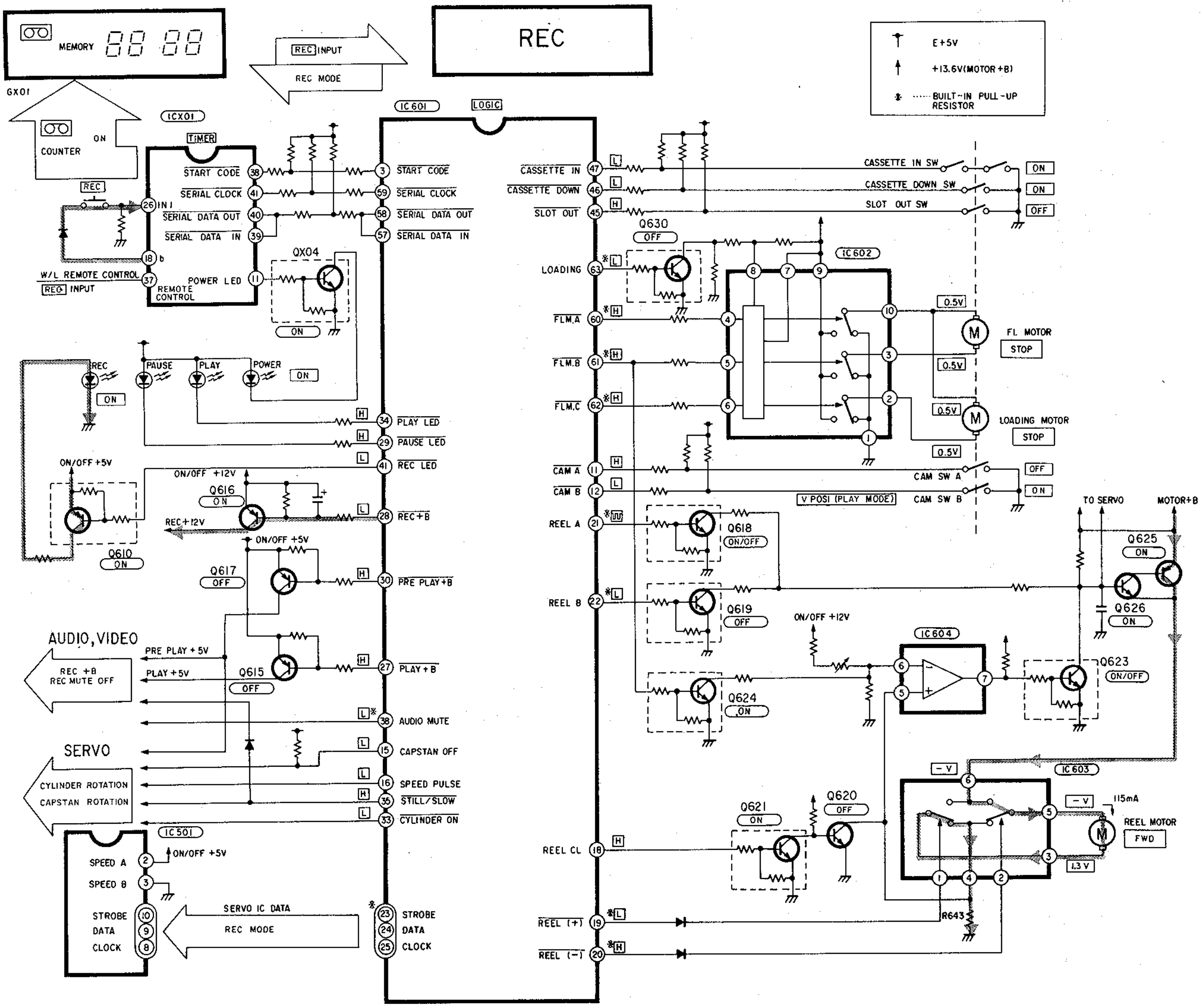

MEMORY
GX01
COUNTER
ON
REC INPUT
REC MODE
REC
IC601
LOGIC
ICX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
W/L REMOTE CONTROL
REC INPUT
REMOTE CONTROL
POWER LED
QX04
ON
PAUSE
PLAY
POWER
ON/OFF +5V
ON/OFF +12V
Q616
ON
REC+12V
Q610
ON
Q617
OFF
AUDIO,VIDEO
PRE PLAY + 5V
PLAY + 5V
REC +B
REC MUTE OFF
Q615
OFF
SERVO
CYLINDER ROTATION
CAPSTAN ROTATION
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
REC MODE
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
Q630
OFF
IC602
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
0.5V
FL MOTOR
STOP
LOADING MOTOR
STOP
CAM SW A
CAM SW B
V POSI (PLAY MODE)
Q618
ON/OFF
Q619
OFF
Q624
ON
ON/OFF +12V
IC604
TO SERVO
MOTOR+B
Q625
ON
Q626
ON
Q623
ON/OFF
IC603
−V
115mA
REEL MOTOR
FWD
1.3V
Q621
ON
Q620
OFF
R643

Fig. 3-5-1

(1) When the REC button is pushed in the stop mode, ICX01 transfers the record input signal serially to IC601 and sets the record mode.

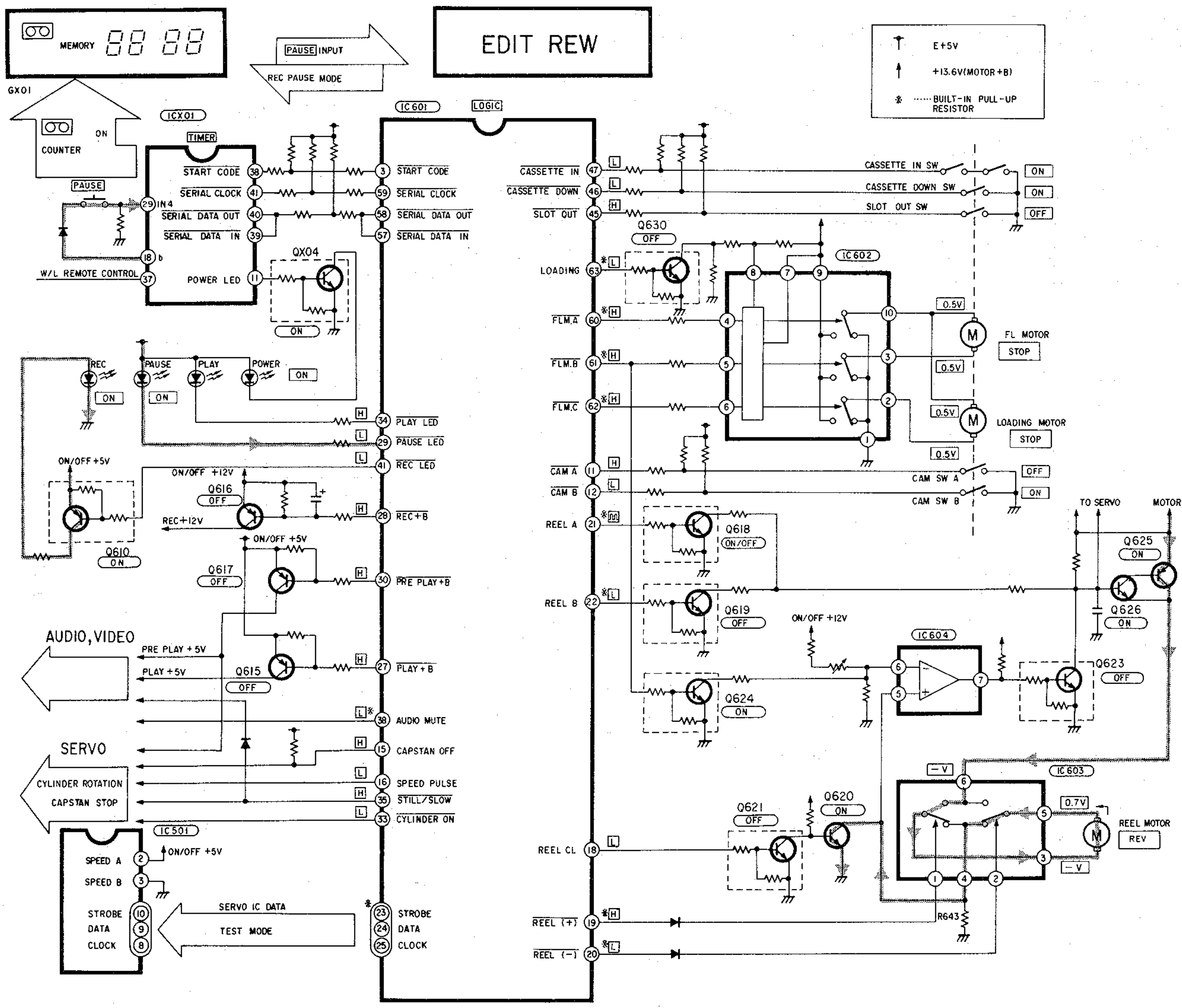
(2) Pin ㊶ of IC601 develops "L" level and Q610 turns on.
The REC LED is also turned on.

(3) The loading mode is set as mentioned in 3-4-1 (1) – (7).

(4) Next, operations which are the same as those mentioned in the playback mode 3-4-2 (1) – (3) are performed and the tape is driven.

(5) Pin ㉘ of IC601 goes "L" level and the REC + 12V is supplied to the audio, video, and the servo circuits, and the recording will be made.

3-5-2 Rewinding for synchronous editing



MEMORY
GX01
COUNTER
ON
PAUSE
PAUSE INPUT
REC PAUSE MODE
EDIT REW
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
IC601
LOGIC
IX01
TIMER
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
IN 4
W/L REMOTE CONTROL
POWER LED
QX04
ON
REC
PLAY
POWER
PLAY LED
PAUSE LED
REC LED
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
REC+B
Q610
Q617
PRE PLAY+B
AUDIO,VIDEO
PRE PLAY + 5V
PLAY +5V
Q615
PLAY+B
AUDIO MUTE
SERVO
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CYLINDER ROTATION
CAPSTAN STOP
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
TEST MODE
CASSETTE IN
CASSETTE DOWN
SLOT OUT
Q630
LOADING
FLM.A
FLM.B
FLM.C
IC602
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
0.5V
FL MOTOR
STOP
LOADING MOTOR
CAM A
CAM B
CAM SW A
CAM SW B
REEL A
REEL B
Q618
ON/OFF
Q619
Q624
TO SERVO
MOTOR+B
Q625
Q626
IC604
Q623
IC603
0.7V
-V
REEL MOTOR
REV
Q620
Q621
REEL CL
REEL (+)
REEL (−)
R643

Fig. 3-5-2

(1) When the PAUSE or STOP button is pushed during recording, IC601 is set to a record pause mode or the stop mode.

(2) The loading motor rotates in forward direction and the cam moves from the position V to the position VI.

(3) Each pin of IC601 develops output as shown in Fig. 3-5-2 and the record LED and pause LED light up. Pin ㉘ develops "H" level output and Q616 turns OFF. Then the audio and video signals are muted.

(4) The reel motor is rotated reversely by IC601 and IC603 (⑰ – ⑲). Tape is wound by a specified length equivalent to 100 CTL pulses and then the loading motor rotates in forward direction and the cam moves from the position VI to the position VII (⑳ – ㉜).

(5) Next, the reel motor rotates in forward direction and winds the tape for a specified length and then the motor stops (㉛ – ㉝). At the same time, the loading motor rotates in reverse direction, and the cam moves from the position VII to the position V.

(6) Furthermore, loading motor rotates in forward direction and the cam moves from the position V to the position VII.

(7) At the same time the reel motor rotates in forward direction and then the reel motor stops.

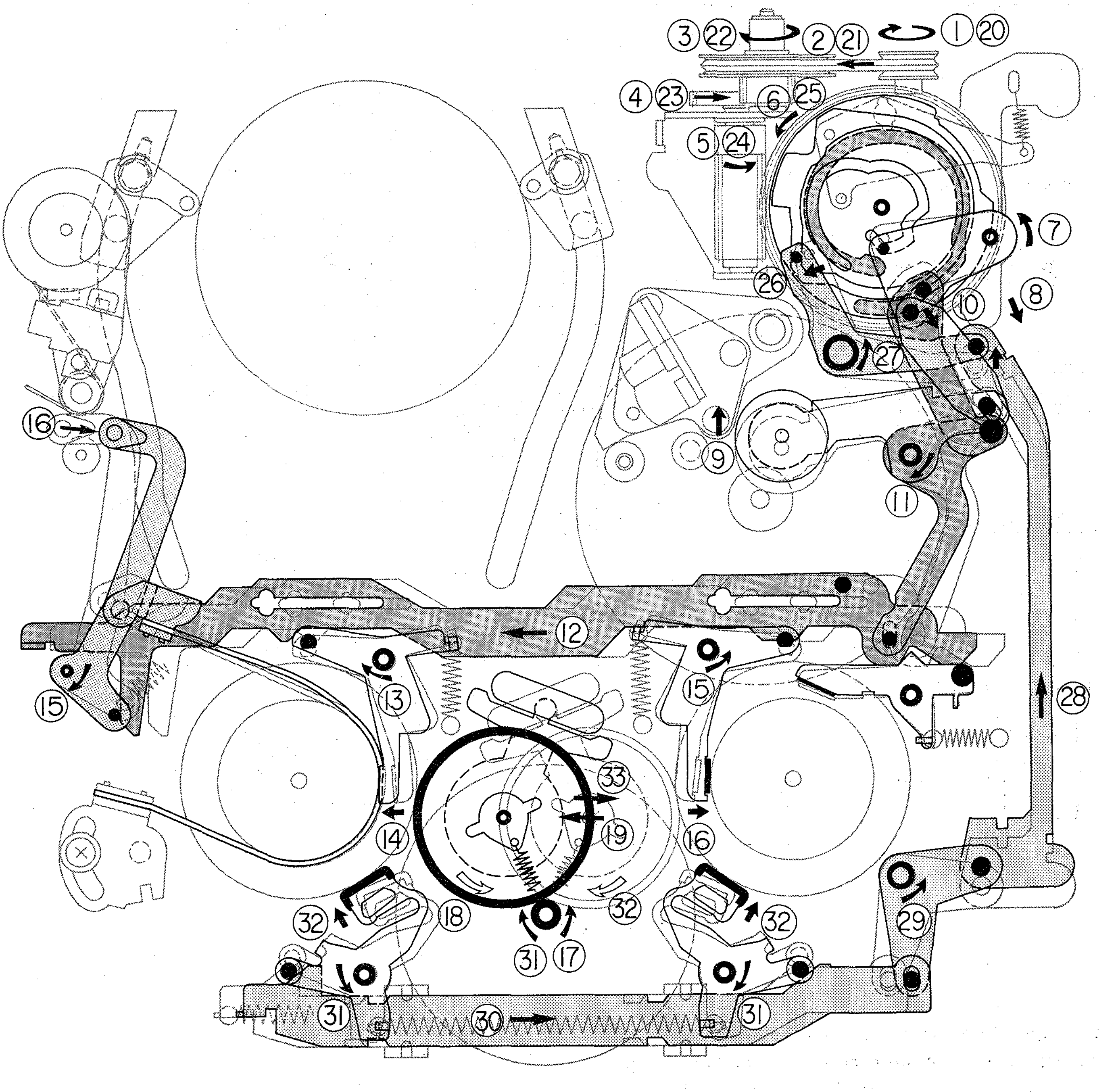
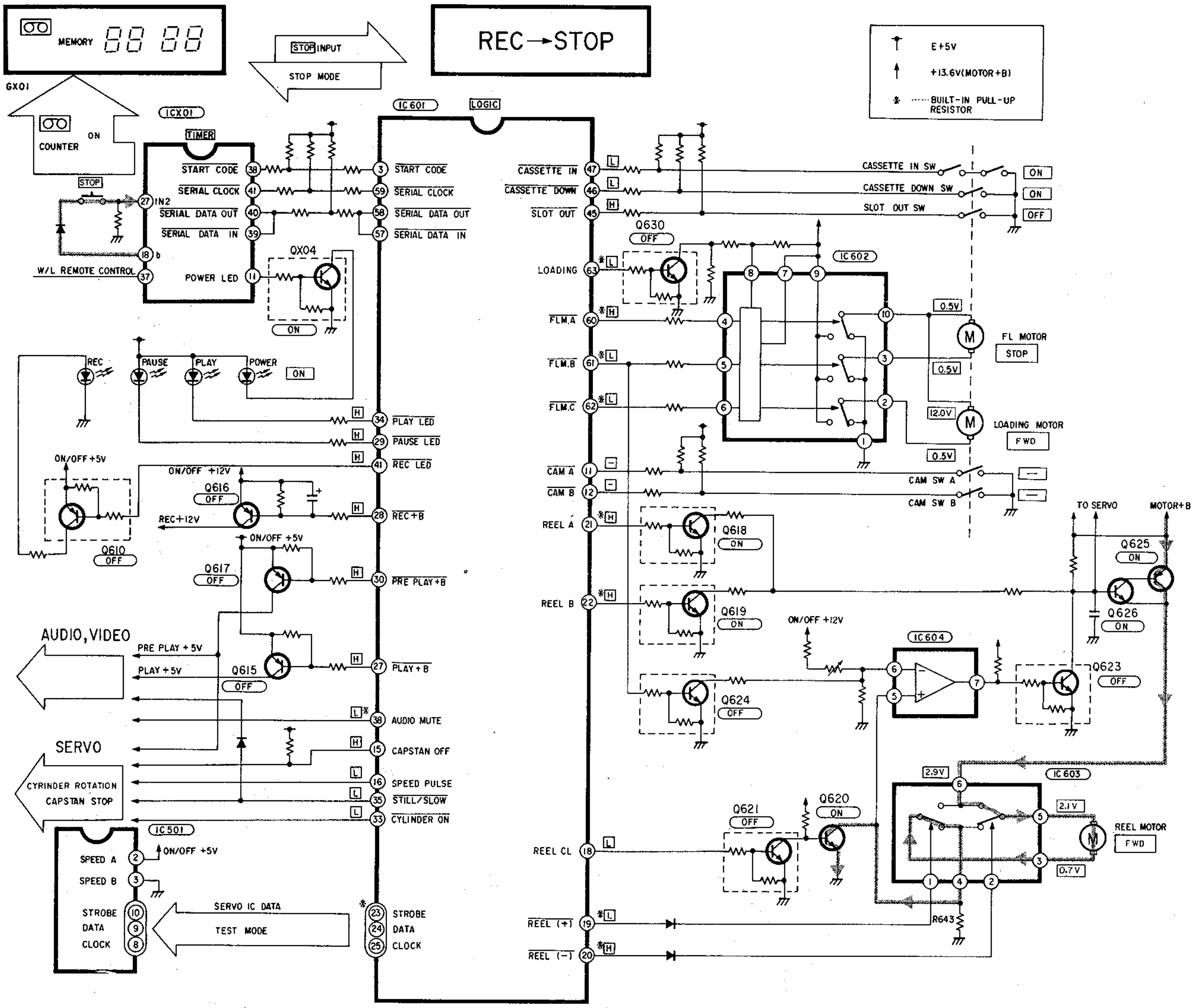

③㉒
②㉑
①⑳
④㉓
⑥㉕
⑤㉔
⑦
㉖
⑧
⑩
㉗
⑨
⑪
⑯
⑫
⑬
⑮
⑮
㉘
㉝
⑭
⑲
⑯
㉙
㉜
⑱
㉜
㉜
㉛
⑰
㉛
㉛
㉚

Fig. 3-5-3

3-5-3 Stop mode (from record to stop)



MEMORY 88 88
GX01
ON
COUNTER
STOP INPUT
STOP MODE
REC→STOP
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
ICX01
TIMER
IC601
LOGIC
STOP
IN2
W/L REMOTE CONTROL
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
POWER LED
QX04
ON
REC
PAUSE
PLAY
POWER
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
Q610
OFF
ON/OFF +5V
Q617
OFF
AUDIO,VIDEO
PRE PLAY + 5V
PLAY + 5V
Q615
OFF
SERVO
CYRINDER ROTATION
CAPSTAN STOP
IC501
SPEED A
SPEED B
STROBE
DATA
CLOCK
ON/OFF +5V
SERVO IC DATA
TEST MODE
PLAY LED
PAUSE LED
REC LED
REC+B
PRE PLAY+B
PLAY+B
AUDIO MUTE
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
STROBE
DATA
CLOCK
CASSETTE IN
CASSETTE DOWN
SLOT OUT
LOADING
FLM.A
FLM.B
FLM.C
CAM A
CAM B
REEL A
REEL B
REEL CL
REEL (+)
REEL (−)
Q630
OFF
IC602
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
ON
ON
OFF
0.5V
FL MOTOR
STOP
0.5V
12.0V
LOADING MOTOR
FWD
0.5V
CAM SW A
CAM SW B
Q618
ON
Q619
ON
Q624
OFF
ON/OFF +12V
IC604
TO SERVO
MOTOR+B
Q625
ON
Q626
ON
Q623
OFF
IC603
2.9V
2.1V
0.7V
REEL MOTOR
FWD
Q621
OFF
Q620
ON
R643

Fig. 3-5-4

(1) When the STOP button is pushed during recording, the unit enters the stop mode after completion of temporary rewind operation for synchronous editing. The cam gear is in the REC pause mode (position VII).

(2) The cylinder motor, reel motor, and capstan motor stops.

(3) When the STOP button is pushed again, unloading operation starts and the cam moves to the position II. (Refer to the unloading operation.)

3-5-4 Record pause (PAUSE)

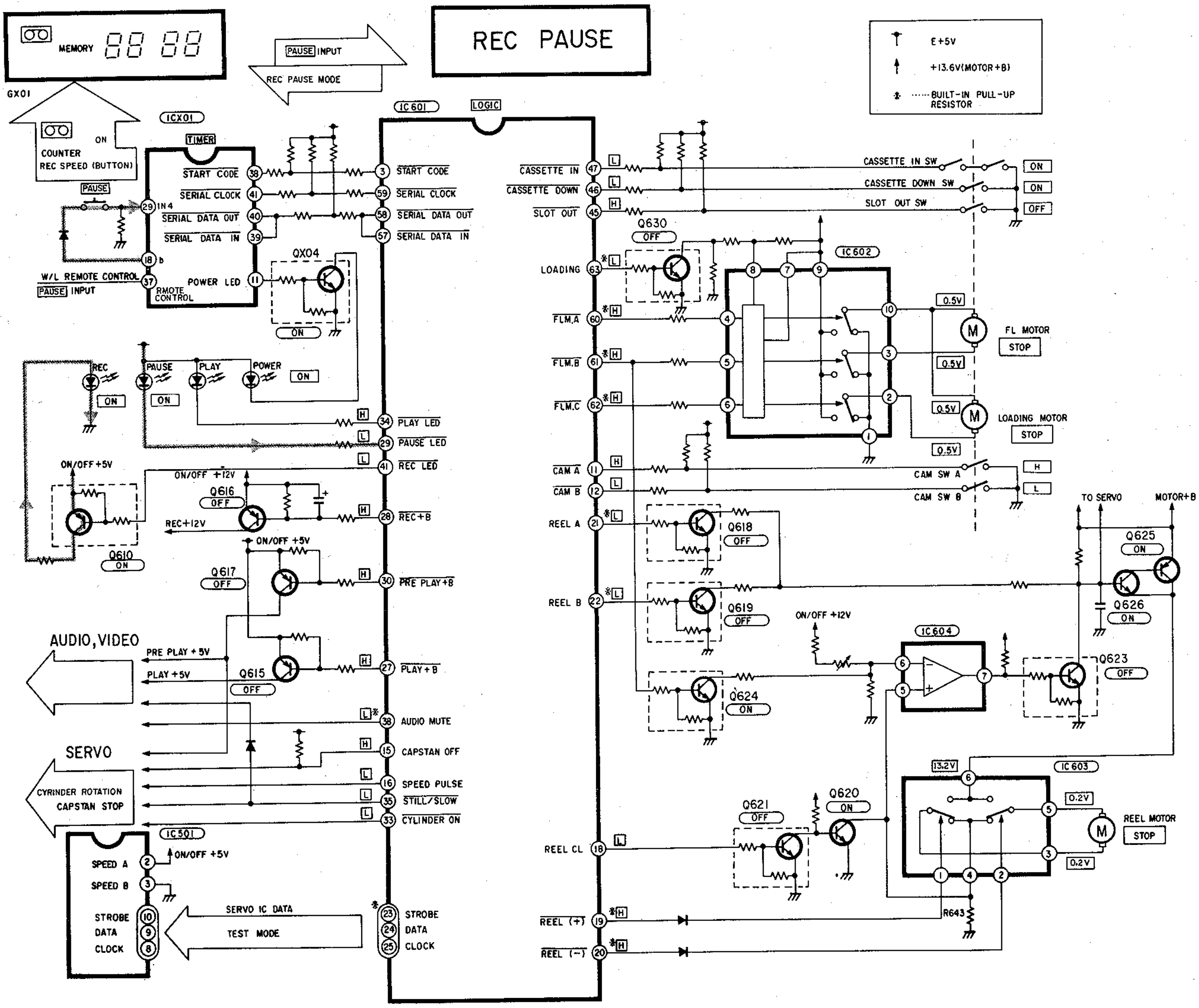

MEMORY 88 88
GX01
ON
COUNTER
REC SPEED (BUTTON)
PAUSE INPUT
REC PAUSE MODE
REC PAUSE
E+5V
+13.6V(MOTOR+B)
BUILT-IN PULL-UP RESISTOR
IC X01
TIMER
START CODE
SERIAL CLOCK
IN 4
SERIAL DATA OUT
SERIAL DATA IN
PAUSE
W/L REMOTE CONTROL
PAUSE INPUT
RMOTE CONTROL
POWER LED
QX04
ON
IC 601
LOGIC
START CODE
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
CASSETTE IN
CASSETTE DOWN
SLOT OUT
CASSETTE IN SW
CASSETTE DOWN SW
SLOT OUT SW
ON
ON
OFF
Q630
OFF
LOADING
IC602
FLM.A
FLM.B
FLM.C
0.5V
FL MOTOR
STOP
LOADING MOTOR
STOP
REC
PAUSE
PLAY
POWER
ON
ON
ON
PLAY LED
PAUSE LED
REC LED
ON/OFF +5V
ON/OFF +12V
Q616
OFF
REC+12V
REC+B
Q610
ON
ON/OFF +5V
Q617
OFF
PRE PLAY+B
CAM A
CAM B
CAM SW A
CAM SW B
H
L
REEL A
Q618
OFF
REEL B
Q619
OFF
TO SERVO
MOTOR+B
Q625
ON
Q626
ON
ON/OFF +12V
IC604
Q623
OFF
Q624
ON
AUDIO,VIDEO
PRE PLAY + 5V
PLAY +5V
Q615
OFF
PLAY+B
AUDIO MUTE
SERVO
CAPSTAN OFF
SPEED PULSE
STILL/SLOW
CYLINDER ON
CYRINDER ROTATION
CAPSTAN STOP
IC 501
ON/OFF +5V
SPEED A
SPEED B
STROBE
DATA
CLOCK
SERVO IC DATA
TEST MODE
STROBE
DATA
CLOCK
13.2V
IC 603
Q621
OFF
Q620
ON
REEL CL
0.2V
REEL MOTOR
STOP
0.2V
R643
REEL (+)
REEL (−)

Fig. 3-5-5

(1) When the PAUSE button is pushed during a recording, the unit enters the record pause mode after completion of temporary rewinding operation for synchronous editing.
In this case the cam gear is in the REC pause mode (position VII).

(2) The cylinder motor rotates, and the capstan motor and the reel motor stop.

(3) Each pin of IC601 develops outputs as shown above and the pause LED lights up.
Pin ㉘ develops "H" level output and Q616 turns OFF, and mutes the audio and video signals.

4. ELECTRIC CIRCUITS

4-1. Power Supply Circuit

4-1-1 Outline

The power supply circuit consists of the line filter circuit, power supply transformer, rectification circuits, voltage regulator circuits, heater power supply (3.6V AC) for the FL display tube, etc.

The major power supply output is divided into four systems: the first system supplies M + B (13.6V), + 12V (ON/OFF 12V), E 12V (EVER 12V) and H +B (HEATER + B); the second system + 9V (rectification output for 5V); the third system + 60V (rectification output for 32V and for bias in the power supply circuit) and; the fourth system –60V (rectification output for – 30V) and –28V to the loads.

Furthermore, 3.6V AC is supplied from the power supply transformer as HEATER voltage for the FL tube.

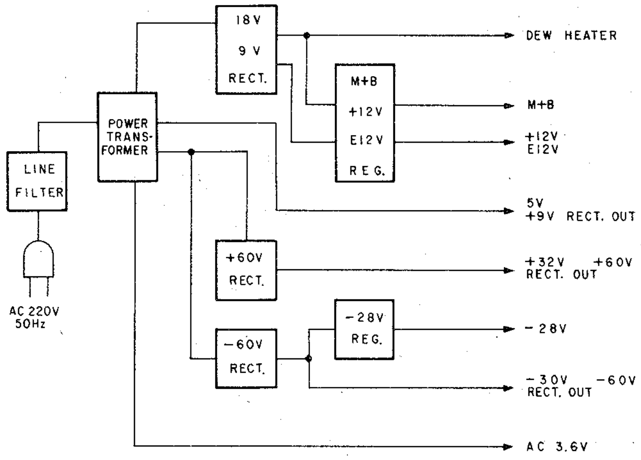


Fig. 4-1-1

4-1-2 Circuit description

1. Rectification circuit

The rectification circuit consists of three systems.

(1) The first system

The first rectifier system generates three rectification outputs.

AC voltage obtained from the first winding of the secondary windings of the power transformer is rectified and smoothed by the bridge rectifier circuit consisting of D801 – D804 and C805. The DC output of approx. 18V is supplied to the voltage regulator circuits for + 12V and E12V.

The voltage developed across the same winding is rectified and smoothed by the bridge rectifier circuit consisting of D801, D802, D805 and D806 to obtain DC voltage of approx. 18V. The DC voltage is supplied to M + B voltage regulator circuit and DEW HEATER.

Finally, center tap output of the first winding on the secondary windings is rectified and smoothed by the full-wave rectifier circuit consisting of D801, D802 and C807. The resultant DC output of approx. 9V is supplied to develope 5V.

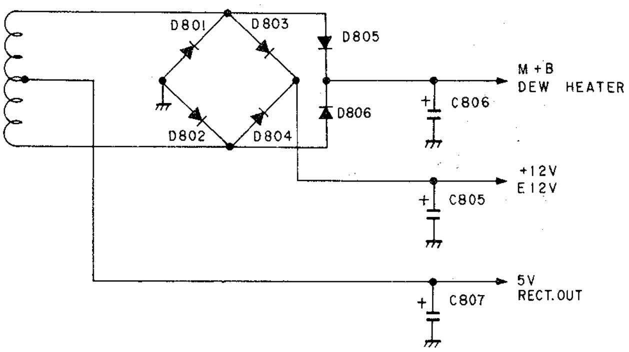


Fig. 4-1-2

(2) The second system

In the second system, AC voltage obtained from the second winding on the secondary windings of the power transformer is half-wave rectified and smoothed by D807 and C808 to obtain DC of approx. + 60V. The voltage is supplied as a bias for the + 32V regulator circuit and power supply circuit.

(3) The third system

In the third system, AC voltage obtained from the second winding on the secondary windings of the power supply transformer is half-wave rectified and smoothed by D808 and C809 to obtain DC of approx. –60V. The voltage is supplied to the voltage regulator circuits for –28V and –30V.

2. Voltage regulator circuits

(1) + 12V voltage regulator circuit

The + 12V voltage regulator circuit consists of the output transistor Q804, error amplifier transistor Q805, reference voltage zener diode D815 and error detection resistors R814, R815, and R851 etc.

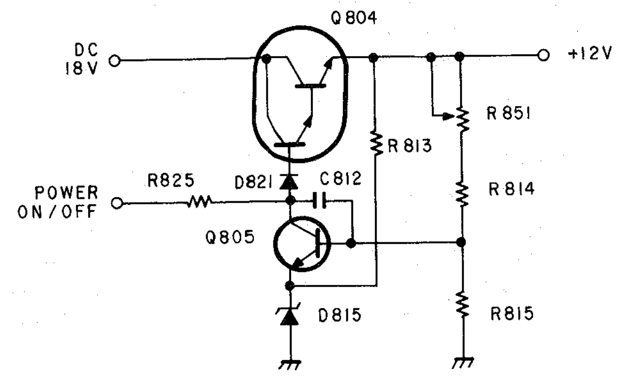

Q804
DC 18V
+12V
R851
R813
R825
D821
C812
R814
POWER ON/OFF
Q805
D815
R815

Fig. 4-1-3

When a bias is supplied from the power ON/OFF circuit through R825, Q804 turns on, supplying current to the zener diode D815 via R813 to generate reference voltage. Then the error amplifier transistor Q805 and error detection resistors R851, R814 and R815 detect error voltage between the reference voltage and the output voltage and control the output transistor Q804 so that it always maintains a constant output of 12V.

(2) M + B (13.6V) voltage regulator circuit

The M + B voltage regulator circuit consists of the output transistor Q802, error amplifier transistor Q803 and error detection resistors R811 and R812.

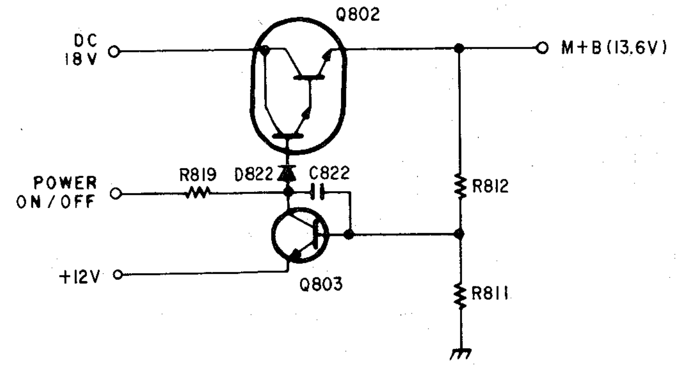

Q802
DC 18V
M+B (13.6V)
POWER ON/OFF
R819
D822
C822
R812
+12V
Q803
R811

Fig. 4-1-4

When a bias is supplied from the power ON/OFF circuit through R819, Q802 turns on. The error detection resistors R811 and R812 detect fluctuation of the output voltage, and the error amplifier transistor Q803 controls the output transistor Q802 in such a way to maintain the output always at 13.6V.

(3) E12V voltage regulator circuit

The E12V voltage regulator circuit consists of the output transistor Q806, zener diode D817 for the reference voltage, etc.

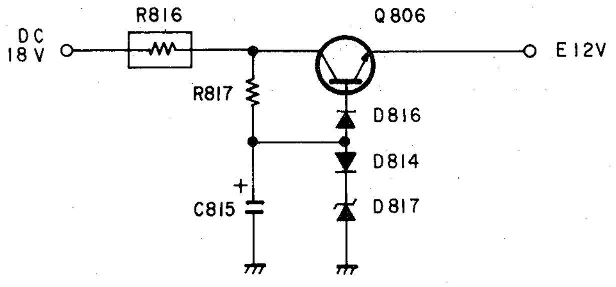

R816
Q806
DC 18V
E12V
R817
D816
D814
C815
D817

Fig. 4-1-6

18V DC rectification output is supplied to the collector of the output transistor Q806 via the fuse resistor R816 and also to the zener diode D817 for the reference voltage via R817, obtaining output of 12V.

(4) –28V voltage regulator circuit

In the –28V voltage regulator circuit, –60V rectifier output is stabilized into –28V by zener diodes D809 and D810 via R802.

(5) DEW HEATER switch circuits

DEW HEATER is controlled by the switching transistor Q801.

The switching transistor Q801 is controlled by the two control signals (DEW HEATER ON, POWER ON/OFF). + 18V rectification output is applied to DEW HEATER and Q801 base (as the bias).

Power OFF:

Q801 base is biased from + 18V rectification output and the DEW heater is turned on.

Power ON:

(When the cylinder is in stop.)

Power ON/OFF signal turns on Q807 (on POWER 2 unit) and this cut off the base bias from +18V rectification output to Q801 base.

However, the DEW heater ON signal turns to "H" and this turns on Q801, so the DEW heater is turned on.

(When the cylinder is rotating)

The DEW heater ON signal turns to "L" and Q801 turns off, so the DEW heater is also turned off.

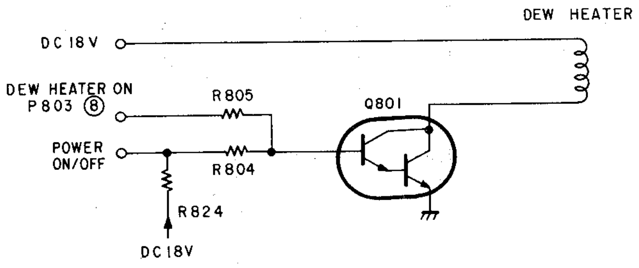

DEW HEATER
DC 18V
DEW HEATER ON
P803 ⑧
R805
Q801
POWER ON/OFF
R804
R824
DC18V

Fig. 4-1-5

(6) Protection circuit

The protection circuit consists of the zener diode D819 for output voltage detection and switching transistors Q808 and Q810.

Q808 base is always supplied with bias from 18V DC via R824 when the power is turned off, or from M + B via R820 when the power is turned on, thus maintaining Q808 at ON and Q810 at OFF.

If the output of M + B or + 12V is short-circuited to the GND etc. and M + B lowers to a value less than the operating voltage of D819, D819 is cut off and Q808 turns off supplying no bias to the Q801 base.

Accordingly, a bias is supplied to the Q810 base via R818 turning Q810 on and turning off the bias for the M + B and +12V circuits, thus cutting off the M + B and + 12V outputs.

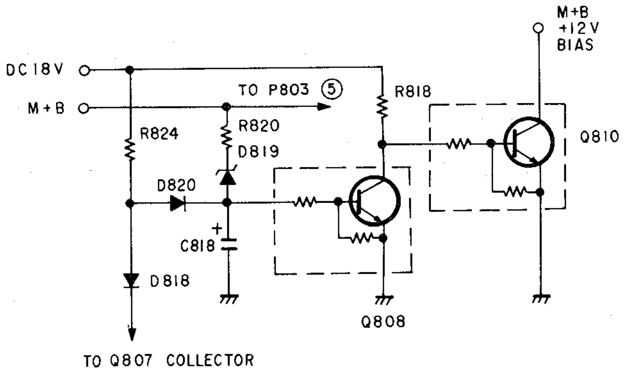

M+B
+12V
BIAS
DC18V
M+B
TO P803 ⑤
R818
R820
D819
R824
Q810
D820
C818
D818
Q808
TO Q807 COLLECTOR

Fig. 4-1-7

4-1-3 TIMER 2 Circuit

(1) Back up + B regulator circuit

EVER 12V supplies a current to zener diode DL10 in passing through a current limiting resistor RL16 and a reverse current protection diode DL12, and the DL10 develops 5V reference voltage.

At the same time, EVER 12V charges capacitor CL10 through the resistor RL14.

If EVER 12V is not applied due to a power failure, etc., the capacitor CL10 supplies the charged electricity as the Back + B through the diode DL13.

(2) Timer reset circuit

Timer reset circuit consists of the reset IC ICL10 (PST520C) and resistor RL10.

ICL10 detects the Back Up + B and generates a reset signal at the time of rising of the Back Up + B at power failure.

(3) –30V voltage regulator circuit

–60V from the power supply enters the zener diode DL11 (05Z30Y) via resistor RL18 for current regulation, generating voltage of –30V.

(4) ON/OFF 5V regulator circuit

ON/OFF 5V is generated by turning on or off EVER 5V with the switching transistors QL11 and QL12 controlled by signal (POWER ON) from pin ⑥ of the connector PL02.

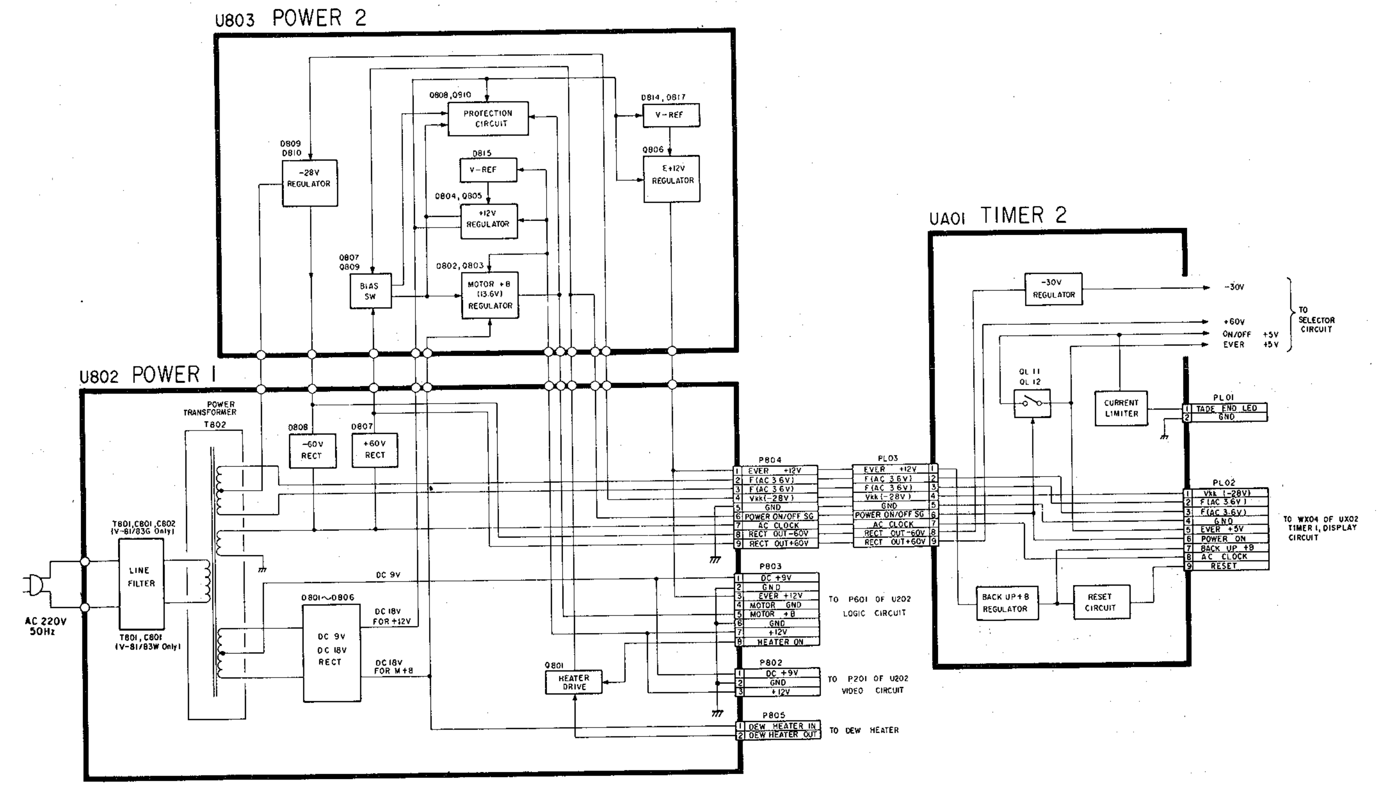

U803 POWER 2
Q808, Q810 PROTECTION CIRCUIT
D814, D817 V-REF
D809 D810 -28V REGULATOR
D815 V-REF
Q806 E+12V REGULATOR
D804, Q805 +12V REGULATOR
Q807 Q809 BIAS SW
Q802, Q803 MOTOR +B (13.6V) REGULATOR
U802 POWER 1
POWER TRANSFORMER T802
Q808 -60V RECT
Q807 +60V RECT
LINE FILTER
AC 220V 50Hz
DC 9V
DC 18V FOR +12V
DC 18V FOR M+B
Q801 HEATER DRIVE
P804
P803
P802
P805
PL03
TO P601 OF U202 LOGIC CIRCUIT
TO P201 OF U202 VIDEO CIRCUIT
TO DEW HEATER
UA01 TIMER 2
-30V REGULATOR
-30V
+60V
ON/OFF +5V
EVER +5V
TO SELECTOR CIRCUIT
QL11 QL12
CURRENT LIMITER
PL01
PL02
BACK UP +B REGULATOR
RESET CIRCUIT
TO WX04 OF UX02 TIMER 1, DISPLAY CIRCUIT

Fig. 4-1-8 Power supply block diagram

4-2. RF and Receiving Circuit

4-2-1 Outline

1) The receiving circuit consists of an ANT input/output circuit, channel selection circuit, PIF and SIF circuits. The receiving circuit selects a desired broadcast signal from TV signals induced on an antenna and sends stable video signal and audio signal obtained by processing program signals to the video and audio circuits.
2) The output signals from the video and audio circuits are converted to a conventional TV signal for the channel 31 to 39 with an RF modulator so that it can be received by conventional TV receivers.

4-2-2 ANT input & output circuits

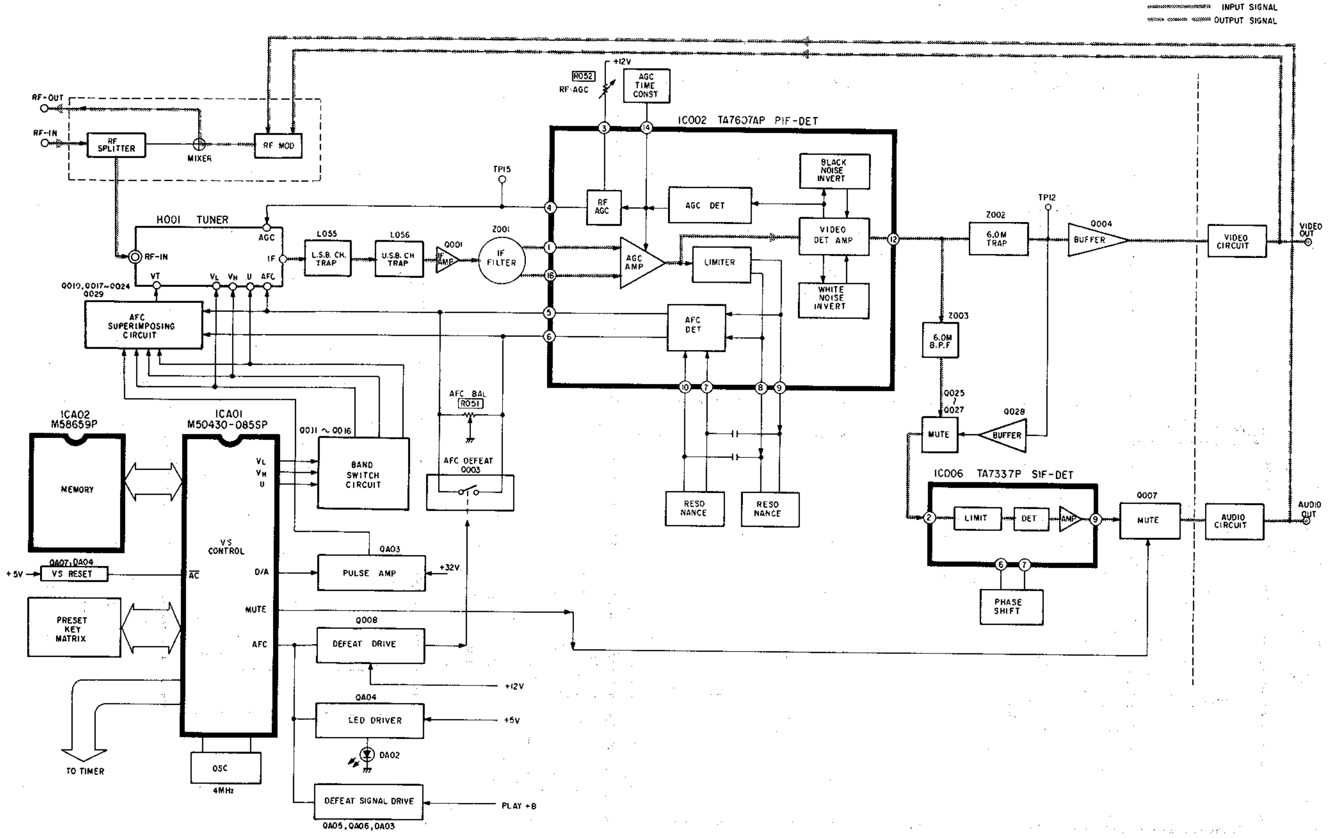
1) In this VTR the RF signal splitter, mixer and the RF modulator have been structured as an integrated unit.
2) The RF splitter splits TV input signals from the antenna into two: and send one of them to the tuner's RF input terminal and another to the mixer.
3) The RF splitter output and the RF modulator output are mixed in the mixer circuit, and the resultant output is used as an RF output. To discriminate the RF modulator output from an antenna input signals a test signal generator has been provided in the modulator. The modulator has been designed so that its output channel can be varied with a control VC to prevent the antenna signals from interference.

4-2-3 PIF, SIF Circuits

1) TV signals from the antenna input circuit are fed to the tuner, and the tuner develops the IF signal corresponding to the channel selected by the channel selector circuit.
2) The IF signal passes the IF filter (surface acoustic wave filter) and enters pins ① , ⑯ of IC002 (TA-7607AP).
3) The IC002 amplifies and detects the IF signal, and the resultant video signal is output from pin ⑫ .

V-81/83G Only

4) One part of the output passes through 5.5 MHz trap circuit and the buffer of Q004, then applied to the video circuit.
5) Another part of the output enters pin ② of IC006 (TA7337P) in passing through 5.5 MHz BPF. The IC006 detects the 5.5 MHz FM signal to obtain audio signal. The audio signal is output from pin⑨ and sent to the audio circuit.



INPUT SIGNAL
OUTPUT SIGNAL
RF-OUT
RF-IN
RF SPLITTER
MIXER
RF MOD
R052
RF AGC
+12V
AGC TIME CONST
IC002 TA7607AP PIF-DET
TP15
RF AGC
AGC DET
BLACK NOISE INVERT
VIDEO DET AMP
WHITE NOISE INVERT
AGC AMP
LIMITER
AFC DET
H001 TUNER
AGC
IF
RF-IN
VT
VL
VH
U
AFC
L055
L.S.B. CH. TRAP
L056
U.S.B. CH TRAP
Q001
IF AMP
Z001
IF FILTER
Q019, Q017~Q024
Q029
AFC SUPERIMPOSING CIRCUIT
Z002
6.0M TRAP
TP12
Q004
BUFFER
VIDEO CIRCUIT
VIDEO OUT
Z003
6.0M B.P.F
Q025
Q027
Q028
MUTE
BUFFER
IC006 TA7337P SIF-DET
LIMIT
DET
AMP
Q007
MUTE
AUDIO CIRCUIT
AUDIO OUT
PHASE SHIFT
RESO NANCE
RESO NANCE
AFC BAL
R051
AFC DEFEAT
Q003
ICA02
M58659P
MEMORY
ICA01
M50430-085SP
Q011 ~ Q016
BAND SWITCH CIRCUIT
VS CONTROL
D/A
MUTE
AFC
QA07, QA04
+5V
VS RESET
PRESET KEY MATRIX
QA03
PULSE AMP
+32V
Q008
DEFEAT DRIVE
+12V
QA04
LED DRIVER
+5V
DA02
OSC
4MHz
TO TIMER
DEFEAT SIGNAL DRIVE
PLAY +B
QA05, QA06, DA03

Fig. 4-2-1 PIF, selector block diagram (81/83G model)

V-81/83W Only

4) One part of the output is applied to the video circuit in passing through 5.5 MHz trap circuit, SYNC UP circuit, and Q003 buffer.
In the SYNC UP circuit, the sync signal is separated with a diode D002 connected to emitter side of Q008 and a capacitor C032, and then the sync section of a video signal suppressed in detection process is expanded properly in IC002, thus the sync level is being corrected.
5) Another part of the output enters pin ② of IC005 (TA7337P) in passing through 5.5 MHz BPF. The IC006 detects the 5.5 MHz FM signal to obtain audio signal. The audio signal is output from pin⑨ and sent to the audio circuit.

4-2-4 Channel selection circuit

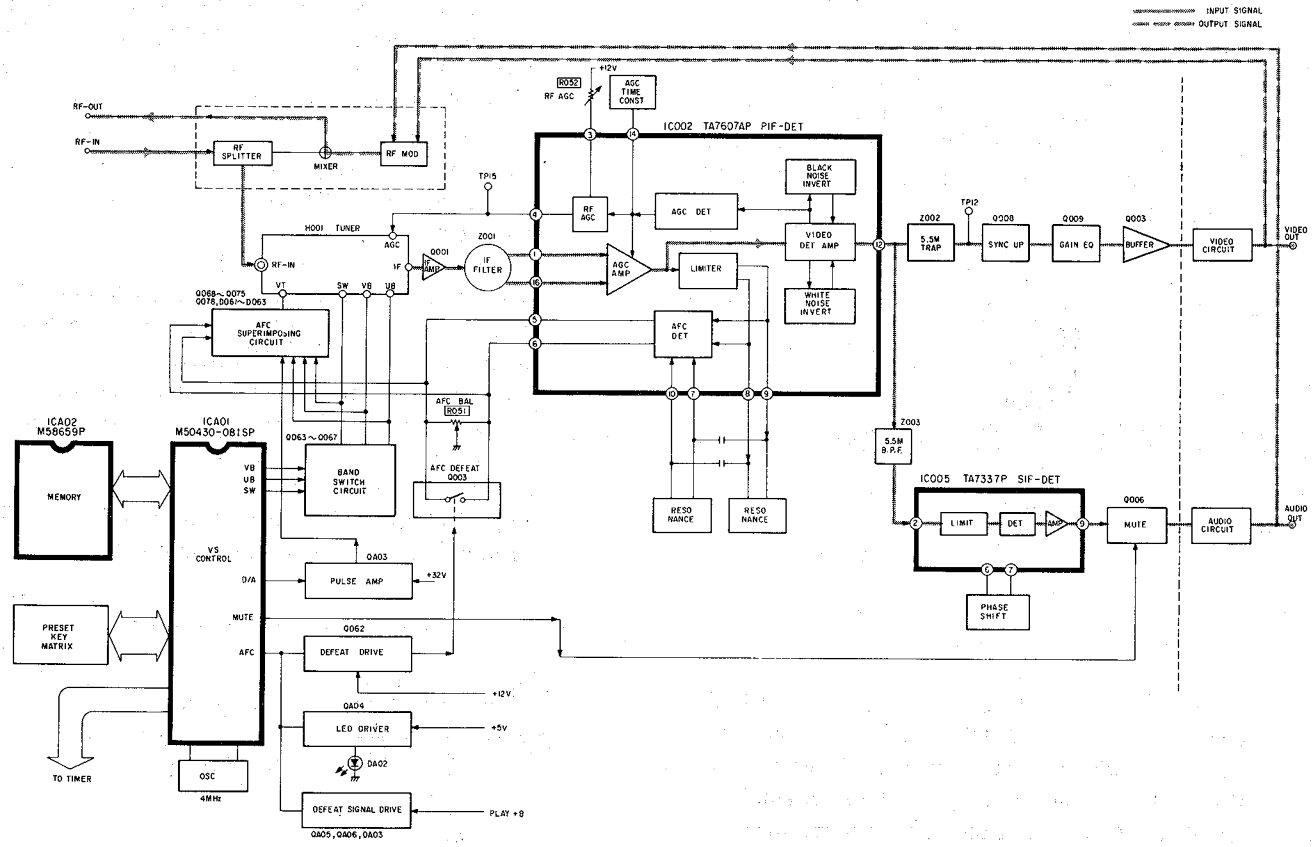
(1) Outline

The channel selection circuit employs a voltage synthesizer (VS). The VS circuit consists of a memory circuit, ICA02 and a VS microcomputer, ICA01. Various information such as band selection & tuning voltage data required for channel selection, data for AFC defeat, and audio muting are transferred serially between the timer microcomputer and the PIF circuit as well as other display data are sent to the timer circuit.

(2) Functions

1) Channel pre-setting mode

The VS microcomputer sends real channel data relating to a band data and a tuning voltage data obtained from the key matrix to the memories to keep the information. The VS microcomputer also sends the same kind of data to the timer circuit to display the information on the FL display tube.



INPUT SIGNAL
OUTPUT SIGNAL
RF-OUT
RF-IN
RF SPLITTER
MIXER
RF MOD
R052
RF AGC
+12V
AGC TIME CONST
IC002 TA7607AP PIF-DET
TP15
RF AGC
AGC DET
BLACK NOISE INVERT
VIDEO DET AMP
WHITE NOISE INVERT
AGC AMP
LIMITER
AFC DET
H001 TUNER
AGC
IF
RF-IN
VT
SW
VB
UB
Q001
IF AMP
Z001
IF FILTER
Q068~Q075
Q078, D061~D063
AFC SUPERIMPOSING CIRCUIT
Z002
5.5M TRAP
TP12
Q008
SYNC UP
Q009
GAIN EQ
Q003
BUFFER
VIDEO CIRCUIT
VIDEO OUT
Z003
5.5M B.P.F.
IC005 TA7337P SIF-DET
LIMIT
DET
AMP
Q006
MUTE
AUDIO CIRCUIT
AUDIO OUT
PHASE SHIFT
RESO NANCE
RESO NANCE
AFC BAL
R051
AFC DEFEAT
Q003
ICA02
M58659P
MEMORY
ICA01
M50430-081SP
Q063 ~ Q067
BAND SWITCH CIRCUIT
VS CONTROL
D/A
MUTE
AFC
PRESET KEY MATRIX
QA03
PULSE AMP
+32V
Q062
DEFEAT DRIVE
+12V
QA04
LED DRIVER
+5V
DA02
OSC
4MHz
TO TIMER
DEFEAT SIGNAL DRIVE
PLAY +B
QA05, QA06, DA03

Fig. 4-2-2 PIF, selector block diagram (81/83W model)

(V-81/83G model)

Table 4-2-1

Band	Microcomputer terminal		
	LB	HB	UB
VL	H	L	L
VH	L	H	L
U	L	L	H

Table 4-2-2

Band	Tuner terminal		
	LB	HB	UB
VL	12V(H)	0V(L)	0V(L)
VH	0V(L)	12V(H)	0V(L)
U	0V(L)	0V(L)	12V(H)

( ): Microcomputer

(V-81/83W model)

Table 4-2-3

Band	Microcomputer terminal		
	VB	UB	SW
VL	H	L	L
VH	H	L	H
U	L	H	L

Table 4-2-4

Band	Tuner terminal		
	VB	UB	SW
VL	12V(H)	0V(L)	23V(L)
VH	12V(H)	0V(L)	0V(H)
U	0V(L)	12V(H)	23V(L)

( ): Microcomputer

2) Conventional reception mode

a. In a conventional channel selecting operation, a channel data is read out from a memory with a channel position data sent from the timer circuit and the data is transferred to the timer section circuit. Furthermore, a band voltage and a tuning voltage of the channel are sent to the PIF section.

b. The band data is output through pins ㉘ , ㉙ , ㉚ . They are indicated in Tables 4-2-1 and 4-2-2.

c. The tuning voltage is a pulse signal modulated in 14 bit format and developed at pin ⑱ . The tuning voltage is amplified by QA03 and then converted into a DC voltage in passing through a filtering network consisting of RA04, RA05, RA06, CA03, CA04, and CA05. Thus developed DC voltage is applied to VT terminal of the tuner.

d. Since noises occur at the time of channel switching, an audio muting pulse from pin ㉑ is applied to the switching circuit of Q007 (V-81/83G) or Q006 (V-81/83W) to eliminate the noises.
Pin ⑳ develops an AFC defeat pulse at the time of channel switching, and the pulse triggers the switching circuits of Q008 and Q003 (V-81/83G) or Q062 and Q061 (V-81/83W) which turn off the AFC at the moment of channel switching, thus preventing erroneous operation of the AFC.

(3) Channel setting with AFC off

When a channel setting is required with the AFC off, push the tuning buttons (+) and (–) in the conventional receive mode, and that position can be memorized with the AFC turned off. In this case, QA04 turns on and LED DA02 lights up.

When releasing, set the CH setting mode and resume the normal receive mode. (V-81/83G)

When releasing, set the CH setting mode and resume the normal receive mode after pushing the tuning buttons (+) and (–). (V-81/83W)

4-3. Timer, Display Circuit

4-3-1 Outline

1) These circuit include various functional circuits such as the timer, channel selection, electronic counter, remote control light signal reception and the logic switch circuits etc., and consist of a microcomputer (TMP47C410AN-6775) playing primarily roles in these circuits, FL display tube (FIP8BLM7 for V-81/83G or FIP8YM7 for V-81/83W) indicating time counted value, channel, cassette, etc.; operation key matrix and the remote control light signal reception circuit. These circuits are used to perform following functions; time count, timer recording channel selection, key input reading, information reading from a wireless remote control unit etc.

4-3-2 Different features from conventional models

1) Conventionally used three microcomputers, each of which is relating to a timer, sublogic and main logic circuits respectively, are replaced by two microcomputers (timer, logic circuit) which also perform operations conducted by the sublogic microcomputer so far.
2) As new features, auto power on and auto play functions are added.

4-3-3 Functions

(1) Clock

1 24 hours digital clock
2 50/60 Hz automatic switching

(2) Programmable timer

1. 4 programs in 14 days
2. Every day, every week or every day (Sun. through Sat.)
3. One touch timer recording (Max. 4 hours)
4. Reserved program confirmation using the confirmation key

(3) Channel selection

1. Real channel display in 16 positions of 0 through 99.
2. Two button UP & DOWN system
3. Band and channel position indication in preset mode (Time display is switched for this indication)

(4) Electronic counter

1. 4 digit indication in FL display tube (Time display is switched for this indication)
2. (Count operation is performed in the logic microcomputer)

(5) Input data reading

1. Data reading from key switches on the unit
2. Data reading from the wireless remote control

(6) Additional functions

1. Auto power on (Inserting a cassette turns the power on automatically.)
2. Auto play (Playback operation automatically starts after completion of tape rewind operation.)

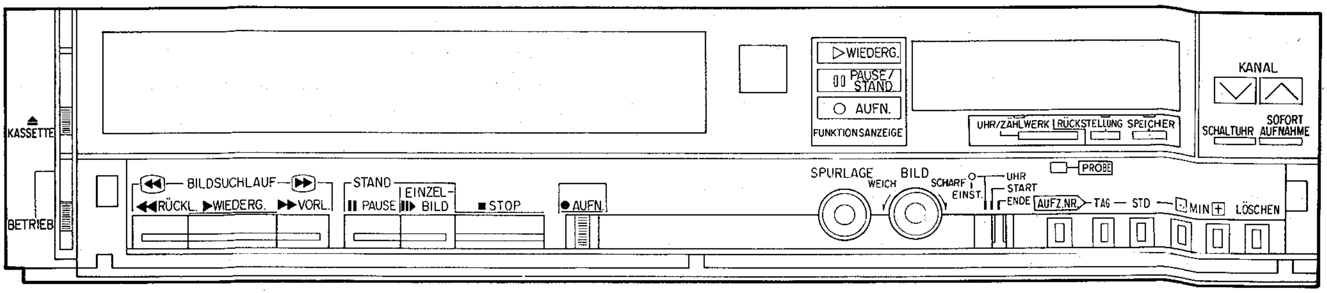

KASSETTE
BETRIEB
▷WIEDERG.
PAUSE/STAND
○ AUFN.
FUNKTIONSANZEIGE
UHR/ZÄHLWERK
RÜCKSTELLUNG
SPEICHER
KANAL
SCHALTUHR
SOFORT AUFNAHME
BILDSUCHLAUF
◀◀RÜCKL.
▶WIEDERG.
▶▶VORL.
STAND
II PAUSE
EINZEL-BILD
■STOP
● AUFN.
SPURLAGE
WEICH
BILD
SCHARF
EINST.
UHR
START
ENDE
PROBE
AUFZ.NR.
TAG
STD
MIN
LÖSCHEN

Fig. 4-3-1 Operation keys

4-3-4 Theory of operation

(1) Operation keys

As can be seen in Fig. 4-3-1, 24 push switches and 1 slide switches are used to control the timer, channel selection, logic mode, counter, and the power of the unit. In addition to this, wireless remote control codes are read through pin ㊲ .

(2) Clock

1) The AC clock signal (utility power frequency) supplied from the power transformer is first wave-shaped by the wave-shape & clamp circuits (DX01) and then applied to pin ㉟ of ICX01, timer microcomputer through the buffer (QX02).
2) The clock operates in synchronization with this clock signal.
   The microcomputer discriminates 50 Hz and 60 Hz and automatically takes required operations.

(3) Channel selection

1) Channel selection is performed by the channel UP and DOWN keys on the unit.
2) The channel selecting operation is conducted inside the ICA01 (M5043-85SP for V-81/83G or M50430-81SP for V-81/83W) on the SELECT P.C. board. The ICA01 controls four bus lines for serial data transmitting. The ICX01 transmits a channel position data relating to the channel selected to ICA01, and the ICA01 transmits a real channel data and a band data to the ICX01, thus allowing the FL display tube to indicate the channel selected (0 – 99).

(4) Serial transmission

1) Data of 4 bits x 16 words are transmitted serially from or to the main logic circuit. This data transmission is performed eight times for every cycle of 30 msec starting from ICX01, IC601, ICX01, . . . alternately in this sequence.
2) When ICX01 develops first output, the start code is set to "L" and after the reception of first transmission from the IC601 the start code is set to "H".
3) In this serial transmission, the ICX01 transmits input key codes, power on, auto play, counter memory, counter values, etc. to the IC601, and the IC601 transmits power on off signal, logic mode signal, counter values, etc. to the ICX01.

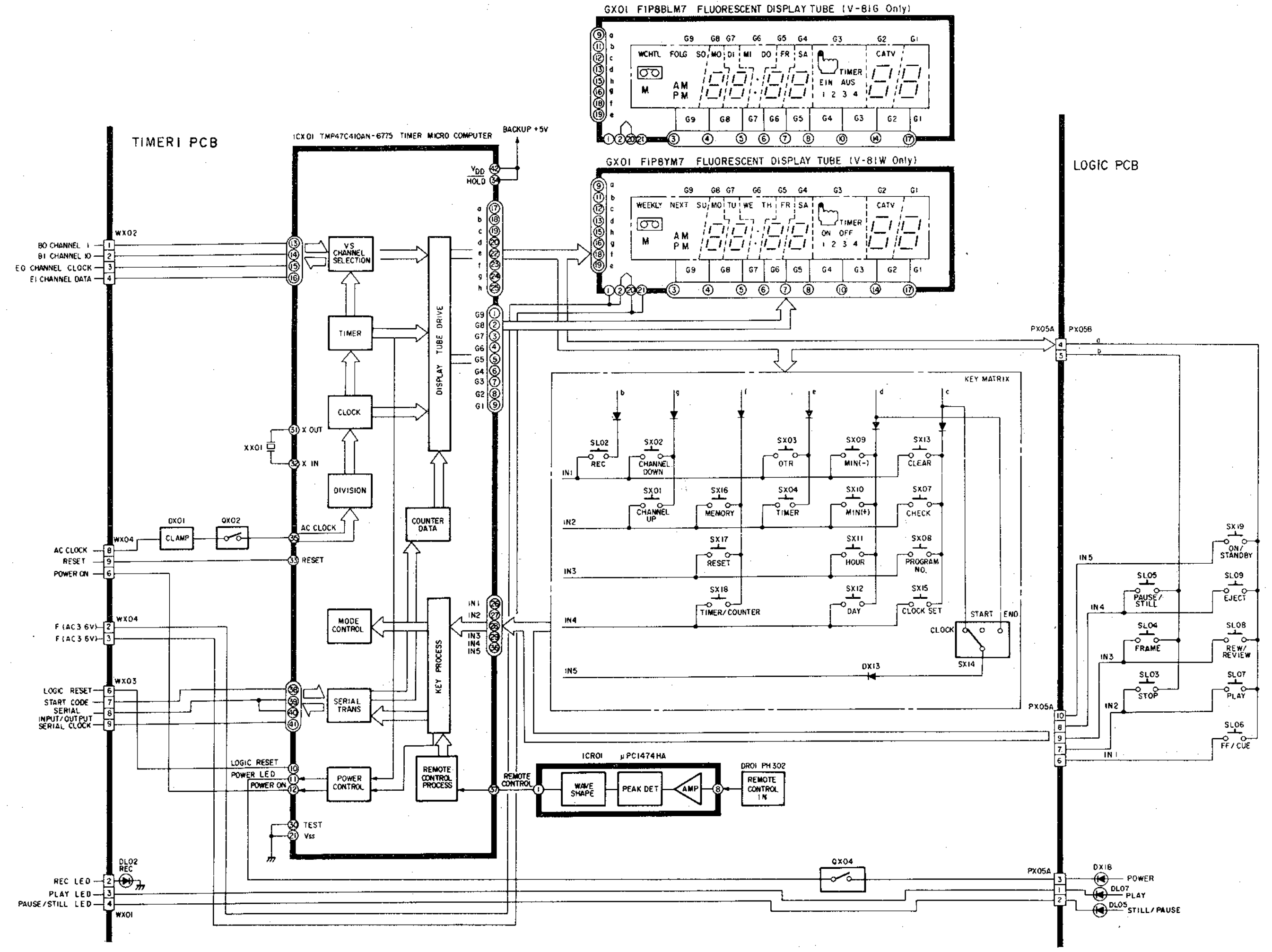

GXO1 FIP8BLM7 FLUORESCENT DISPLAY TUBE (V-81G Only)
GXO1 FIP8YM7 FLUORESCENT DISPLAY TUBE (V-81W Only)
TIMER1 PCB
LOGIC PCB
KEY MATRIX
DISPLAY TUBE DRIVE
KEY PROCESS
TIMER
CLOCK
DIVISION
MODE CONTROL
SERIAL TRANS
POWER CONTROL
REMOTE CONTROL PROCESS
COUNTER DATA
WAVE SHAPE
PEAK DET
AMP
CLAMP

Fig. 4-3-2 Timer, display block diagram (81G/W model)

(5) Electronic counter

1) Operation of the electronic counter is conducted inside IC601.
   Counted values are transmitted serially and the content is displayed on the display tube.

(6) FL display tube

- Time, content of timer reserved programs, or a counter value is switched and displayed.
- Furthermore, cassette, counter memory, and a real channel selected are displayed.
- A dynamic drive system which lights up each digit segment sequentially with grid pulses and segment pulses sent from the microcomputer is employed in the FL display tube.
- The FL display tube is of triode type and lights up when both of the grid voltage Ec and the plate voltage Eb become +27V against the filament center voltage (–22V).
- To turn off the display tube, Ec or Eb must be lowered to 6V below the filament voltage.

(7) Power failure compensation

1) When power failure occurs, content of reserved programs, etc. will be maintained if the failure is resumed within 0.5 sec.
   The display tube turns off during the power failure but its colon will blink after the failure is resumed.

(8) Additional function

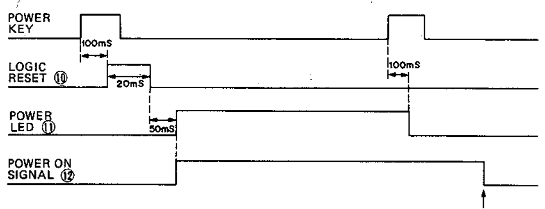
1) Auto power on

Loading a cassette turns the power on automatically, if the power is turned off.

2) Auto play

When the PLAY key is pushed with the REW key during rewind operation, the auto PLAY mode is set and the playback LED blinks. And the PLAY mode is automatically set when the rewind operation completes.

The auto play mode does not work with the wireless remote control unit.


POWER KEY
100mS
100mS
LOGIC RESET ⑩
20mS
POWER LED ⑪
50mS
POWER ON SIGNAL ⑫
AFTER POWER OFF REQUEST FROM LOGIC CIRCUIT

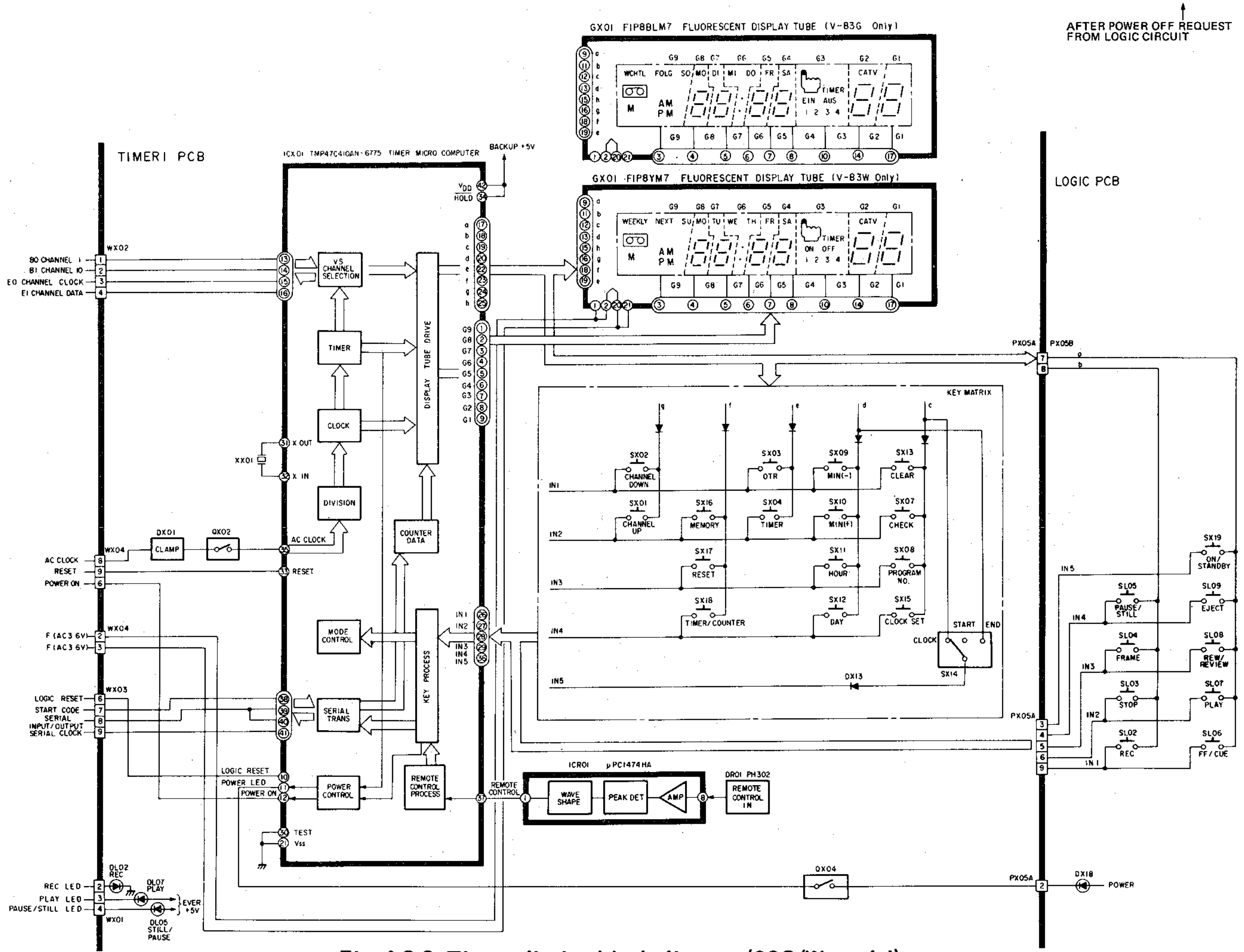

GXO1 FIP8BLM7 FLUORESCENT DISPLAY TUBE (V-83G Only)
GXO1 FIP8YM7 FLUORESCENT DISPLAY TUBE (V-83W Only)
TIMER1 PCB
LOGIC PCB
KEY MATRIX
DISPLAY TUBE DRIVE
KEY PROCESS
TIMER
CLOCK
DIVISION
MODE CONTROL
SERIAL TRANS
POWER CONTROL
REMOTE CONTROL PROCESS
COUNTER DATA
WAVE SHAPE
PEAK DET
AMP
CLAMP

Fig. 4-3-3 Timer, display block diagram (83G/W model)

4-4. Logic Circuit

4-4-1 Outline

1) The logic circuit consists of two microcomputers TMP4746N5759 (for system control . . . . hereafter called logic microcomputer) and TMP47410AN6775 (for button operation, remote control processing, etc. . . . . hereafter called timer microcomputer); main unit which performs the system control; timer unit which controls each mode operation and the LED indication; and the logic switch unit.

2) Mechanism control for each mode is conducted with a cam system. A slot-in mechanism is employed for tape loading. Controls for these mechanisms are performed by the electronic logic operations using the microcomputers stated above.

3) Fig. 4-4-1 shows the system block diagram of the logic circuit.

4-4-2 Functions

(1) Mode operation

Fig. 4-4-3 shows a mode shift diagram.

Operation of each button is accepted through the routine shown in Fig. 4-4-2. During the mode shift operation, IC601 performs the system control as follows:

1) Determines an operation mode by analyzing input signals from the operation button(s) and sensor switches provided to detect abnormal operation, etc.

2) Performs the mode LED display and the counter control and sends the counted value to ICX01.

3) Controls servo systems (servo IC, cylinder motor and capstan motor).

4) Controls audio and video systems (mode +B, and muting signals)

5) Controls the loading motor to set a desired cam position, thus controlling the mechanism system. (Output: pins ⑥⓪, ⑥①, ⑥②, ⑥③ of IC601) (Input : pins ⑪, ⑫ of IC601)

6) Controls the reel motor.

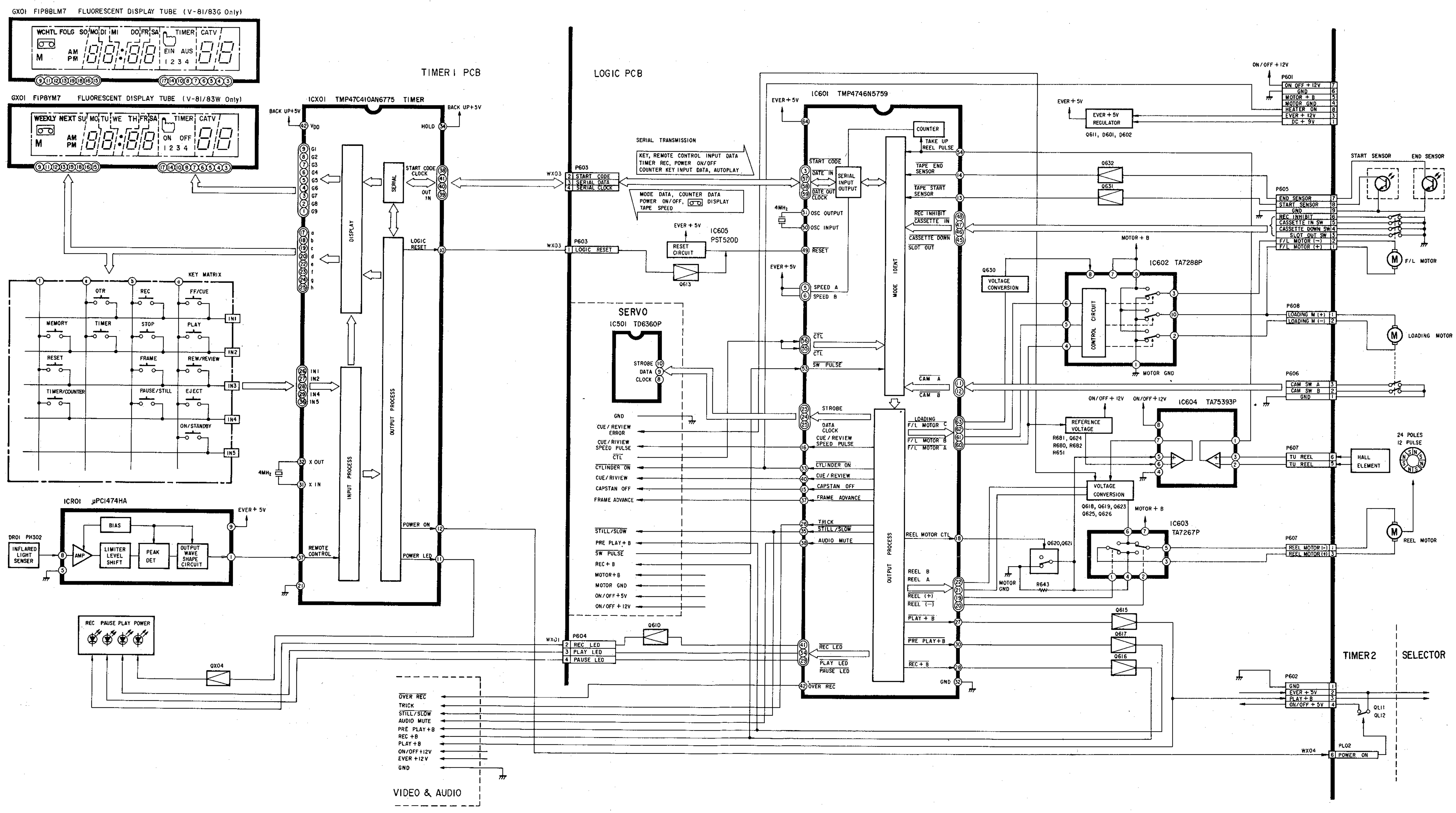

GXOI FIP8BLM7 FLUORESCENT DISPLAY TUBE (V-81/83G Only)
GXOI FIP8YM7 FLUORESCENT DISPLAY TUBE (V-81/83W Only)
TIMER 1 PCB
LOGIC PCB
ICXOI TMP47C410AN6775 TIMER
BACK UP+5V
HOLD
DISPLAY
SERIAL
START CODE
CLOCK
OUT
IN
LOGIC RESET
INPUT PROCESS
OUTPUT PROCESS
POWER ON
POWER LED
REMOTE CONTROL
X OUT
X IN
4MHz
KEY MATRIX
OTR
REC
FF/CUE
MEMORY
TIMER
STOP
PLAY
RESET
FRAME
REW/REVIEW
TIMER/COUNTER
PAUSE/STILL
EJECT
ON/STANDBY
IN1
IN2
IN3
IN4
IN5
ICROI μPC1474HA
BIAS
AMP
LIMITER LEVEL SHIFT
PEAK DET
OUTPUT WAVE SHAPE CIRCUIT
DROI PH302
INFLARED LIGHT SENSER
REC PAUSE PLAY POWER
QX04
SERIAL TRANSMISSION
KEY, REMOTE CONTROL INPUT DATA
TIMER REC, POWER ON/OFF
COUNTER KEY INPUT DATA, AUTOPLAY
MODE DATA, COUNTER DATA
POWER ON/OFF, DISPLAY
TAPE SPEED
P603
START CODE
SERIAL DATA
SERIAL CLOCK
LOGIC RESET
RESET CIRCUIT
IC605 PST520D
Q613
SERVO
IC501 TD6360P
STROBE
DATA
CLOCK
GND
CUE/REVIEW ERROR
CUE/REVIEW SPEED PULSE
CTL
CYLINDER ON
CUE/REVIEW
CAPSTAN OFF
FRAME ADVANCE
STILL/SLOW
PRE PLAY+B
SW PULSE
REC+B
MOTOR+B
MOTOR GND
ON/OFF+5V
ON/OFF+12V
P604
REC LED
PLAY LED
PAUSE LED
Q610
OVER REC
TRICK
STILL/SLOW
AUDIO MUTE
PRE PLAY+B
REC+B
PLAY+B
ON/OFF+12V
EVER+12V
GND
VIDEO & AUDIO
IC601 TMP4746N5759
EVER+5V
COUNTER
TAKE UP REEL PULSE
TAPE END SENSOR
TAPE START SENSOR
REC INHIBIT
CASSETTE IN
CASSETTE DOWN
SLOT OUT
OSC OUTPUT
OSC INPUT
RESET
SPEED A
SPEED B
MODE IDENT
SERIAL INPUT OUTPUT
CAM A
CAM B
LOADING F/L MOTOR C
F/L MOTOR B
F/L MOTOR A
REEL MOTOR CTL
REEL B
REEL A
REEL (+)
REEL (-)
PLAY+B
PRE PLAY+B
REC+B
GND
OVER REC
P601
ON/OFF+12V
MOTOR+B
MOTOR GND
HEATER ON
EVER+12V
DC+9V
EVER+5V REGULATOR
Q611, D601, D602
Q632
Q631
Q630 VOLTAGE CONVERSION
IC602 TA7288P
CONTROL CIRCUIT
MOTOR GND
P605
END SENSOR
START SENSOR
SLOT OUT SW
F/L MOTOR (-)
F/L MOTOR (+)
START SENSOR
END SENSOR
F/L MOTOR
P608
LOADING M (+)
LOADING M (-)
LOADING MOTOR
P606
CAM SW A
CAM SW B
IC604 TA75393P
REFERENCE VOLTAGE
R681, Q624
R680, R682
R651
VOLTAGE CONVERSION
Q618, Q619, Q623
Q625, Q626
P607
TU REEL
HALL ELEMENT
24 POLES
12 PULSE
IC603 TA7267P
Q620, Q621
R643
REEL MOTOR (+)
REEL MOTOR (-)
REEL MOTOR
Q615
Q617
Q616
TIMER2
SELECTOR
P602
EVER+5V
PLAY+B
ON/OFF+5V
QL11
QL12
WX04
PL02
POWER ON

Fig. 4-4-1 Logic circuit system block diagram

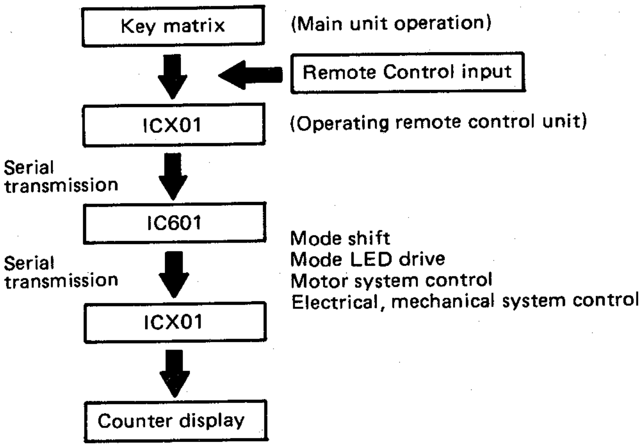

Key matrix
(Main unit operation)
Remote Control input
ICX01
(Operating remote control unit)
Serial transmission
IC601
Mode shift
Mode LED drive
Motor system control
Electrical, mechanical system control
Serial transmission
ICX01
Counter display

Fig. 4-4-2 Mode shift

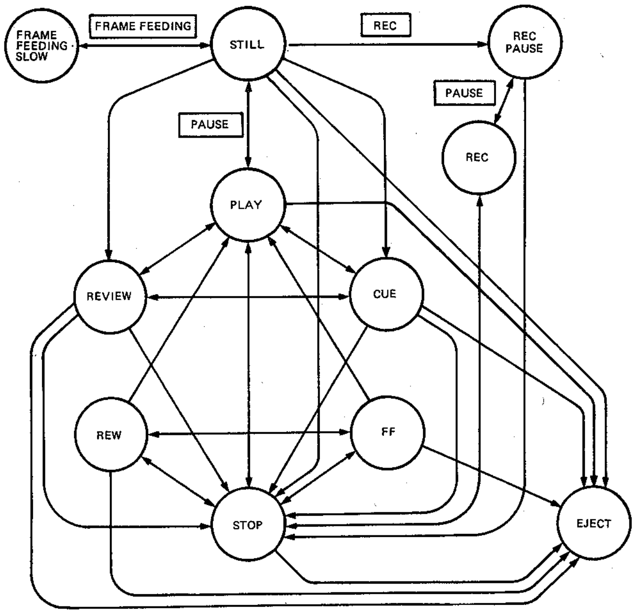

FRAME FEEDING SLOW
FRAME FEEDING
STILL
REC
REC PAUSE
PAUSE
PAUSE
REC
PLAY
REVIEW
CUE
REW
FF
STOP
EJECT

Fig. 4-4-3 Mode shift diagram

(2) Slot mechanism control

Input : Pins ㊺, ㊻, ㊼, ⑬, ⑭of IC601

Output: Pins (60), (61), (62) of IC601

1) During cassette loading or unloading operation, IC601 checks status of three FL-SW (cassette in ㊼, cassette down ㊻, and slot out ㊺) and controls the FL motor.
2) IC601 also checks status of tape end sensors (tape start sensor ⑬ and tape end sensor ⑭) after the packet is moved down and performs the eject operation if no cassette is loaded.

(3) Loading mechanism control

Input : Pins ⑪, ⑫ of IC601

Output: Pins (60), (61), (62), (63)of IC601

- During loading, unloading or cam position transitional period, IC601 checks status of the cam switches (Cam A ⑪, Cam B ⑫) and controls the loading motor.

(4) Tape end detection (tape start)

Input : Pin ⑬ of IC601

1) When tape start position is detected in a rewind mode or review mode, the rewind operation is stopped and a short length of tape is wound in forward direction.
2) When tape start position is detected in a forward mode, a short length of tape is rewound and then the unit enters that mode.

(5) Tape end detection (tape end)

Input : Pin ⑭ of IC601

- When the tape end is detected during forward modes such as playback, recording, etc., the tape is automatically rewound.
  (In the timer recording mode, the rewind operation is not performed but the unit enters the stop mode and the power is automatically shut off.)

(6) Accidental erase prevention

Input: Pin ㊽ of IC601

- If a cassette with its safety tab removed is loaded, the record mode can not be set, and when the REC button is pushed the cassette is automatically ejected.

(7) Timer recording

Input: Serial transferring

- The timer recording mode is set with the timer recording input sent from the timer microcomputer. ICX01.

(8) Synchronous editing

- After completion of the following mode change operations (from record to stop or record pause; from still to record pause or timer record), tape is slightly rewound to allow overlap recording for that area.

(9) Counter memory

- When fast forward or rewind operation is performed with the counter memory mode actuated, the VTR stops automatically when the counter reaches "0000". To increase stop position accuracy of the tape, output from pin ㉑ of IC601 is controlled in terms of PWM so that the rotating speed of the reel is slow down at a location preceded by 200 count pulses from the zero stop position.

(10) Auto play

1) When the PLAY button is pushed with the REW button during rewind mode, auto play mode is set and the playback LED blinks at a rate of 1 Hz.
2) If the counter memory mode is set, playback mode is automatically set after the zero stop operation.
3) The playback operation starts automatically after detection of a tape start position.

(11) Auto power on

- When a cassette is newly loaded under the power off condition, the power is automatically turned on and the cassette is slotted in and loaded.

(12) Audio muting

Output: Pin ㊳ of IC601

- Audio signals are muted during the frame, still, and picture search operations.

(13) Automatic mode release

- To protect tape from damage the still, slow, or the record pause mode is automatically released after a specified time elapsed as shown in Table 4-4-1 below.

Table 4-4-1 Automatic mode release time

Mode	Released after:	Mode after released
Still/Frame	Approx. 5 min.	Playback
Rec · Pause	Approx. 10 min.	Stop

(14) Abnormal reel rotation detection

Input: Pins ㊹ of IC601

- If rotational pulses from the take-up reel do not enter for a specified period determined for each mode as shown in Table 4-4-2, IC601 assumes there may be some troubles in the mechanism, etc. and sets the stop mode.
  If abnormality is detected during timer recording, the power is automatically turned off.

Table 4-4-2 Reel abnormal rotation detection time

Modes	Detection time
FF	Approx. 2.5 sec.
REW	Approx. 3.5 sec.
CUE	Approx. 2.5 sec.
Review	Approx. 10 sec.
PLAY	Approx. 2.5 sec.
Frame	Approx. 90 sec.
REC	Approx. 2.5 sec.
Unloading	—

(15) Abnormal cylinder rotation detection

Input: Pin ㊸ of IC601

- If switching pulse input does not vary for approx. 3 seconds with the cylinder motor rotating, the VTR enters the stop mode. However, when abnormality is found during timer recording, the power is shut off.

(16) Motor protection

Provisions for motor protection is provided as shown in Table 4-4-3.

Table 4-4-3 Motor protection function

Mode	Abnormal operation	Abnormality detection time	Operation made shifts to:
Slot in	Cassette in SW Off.	Approx. 0.5 sec.	Slot out
	Cassette does not move down.	Approx. 3 sec.	Slot out
Slot out	Cassette does not move out.	Approx. 3 sec.	Slot in
Slot in after abnormality detection in slot out operation.	Cassette does not move down.	Approx. 3 sec.	Power turned off after FL motor was stopped.
Loading	Cam does not move to its correct position.	Approx. 10 sec.	Power turned off after loading motor was stopped.
Unloading	Cam does not move to its correct position.	Approx. 10 sec.	Power turned off after loading motor was stopped.

4-5. Servo Circuit

4-5-1 Outline

(1) In the servo circuit, a digital servo IC (TD6360P) functions a primary role and controls the cylinder motor and the capstan motor. The servo circuit performs functions as shown below.

1) Controls rotating speed and phase of video head . . . . Cylinder servo circuit
2) Controls tape speed at a specified value so that the video heads can precisely trace tape patterns in playback operation. . . . . Capstan servo circuit
3) Drives the tape at speed of seven time the normal speed . . . . Reel servo circuit
4) Noise shifting . . . . Capstan pulse drive
5) Vertical sync separation circuit, various amplifier circuits.
6) Controls synchronous editing.

4-5-2 Servo IC

(1) The servo IC, TD6360P is a 42 pin shrink type IC which has been newly developed with following functions:

1) Cylinder system processing circuits: phase detection, speed detection, reference signal generation
2) Capstan system processing circuits: phase detection, speed detection, reference signal generation
3) Built-in Schmitt amplifiers for input signals (PG, FG, CTL).
4) Cylinder fH correction circuit.
5) Built-in control record current source.
6) Synchronous editing function

(2) Pin configuration is almost the same as that of TD6314P, but differs in that the function 4) shown above was added and the mode designation is conducted by serial data inputs to pins ⑧ – ⑩.

4-5-3 Cylinder servo circuit

The cylinder servo circuit controls rotational speed and phase of the video heads so that video signals can be recorded on specified video track correctly in the record mode and the heads can precisely trace on the recorded patterns in playback mode.

(1) PG and SW pulse generation circuits

1) The PG pulse is created by detecting rotation of the PG magnets mounted on the lower part of the cylinder with the fixed PG heads. When the servo is locked, the PG pulse is set approx. 0.9 msec before head switching point. Fig. 4-5-2 shows the block diagram and Fig. 4-5-1 shows the timing chart.

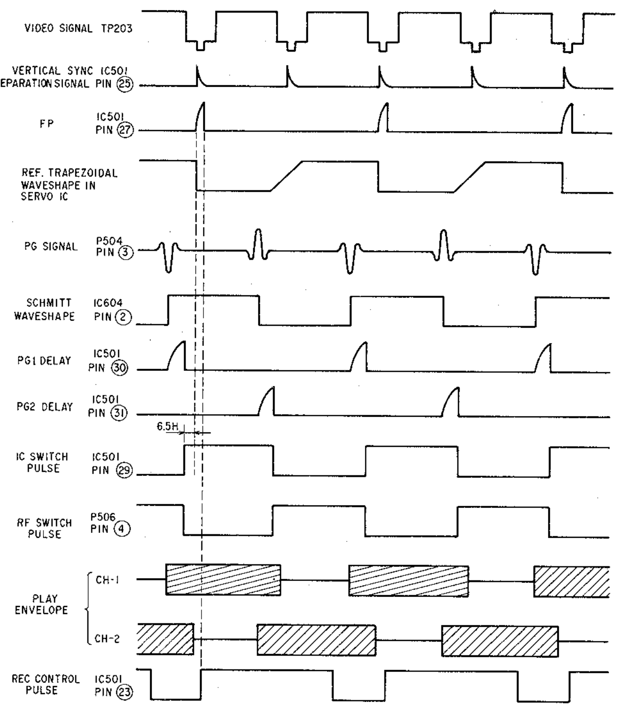


Fig. 4-5-1 Cylinder servo timing chart

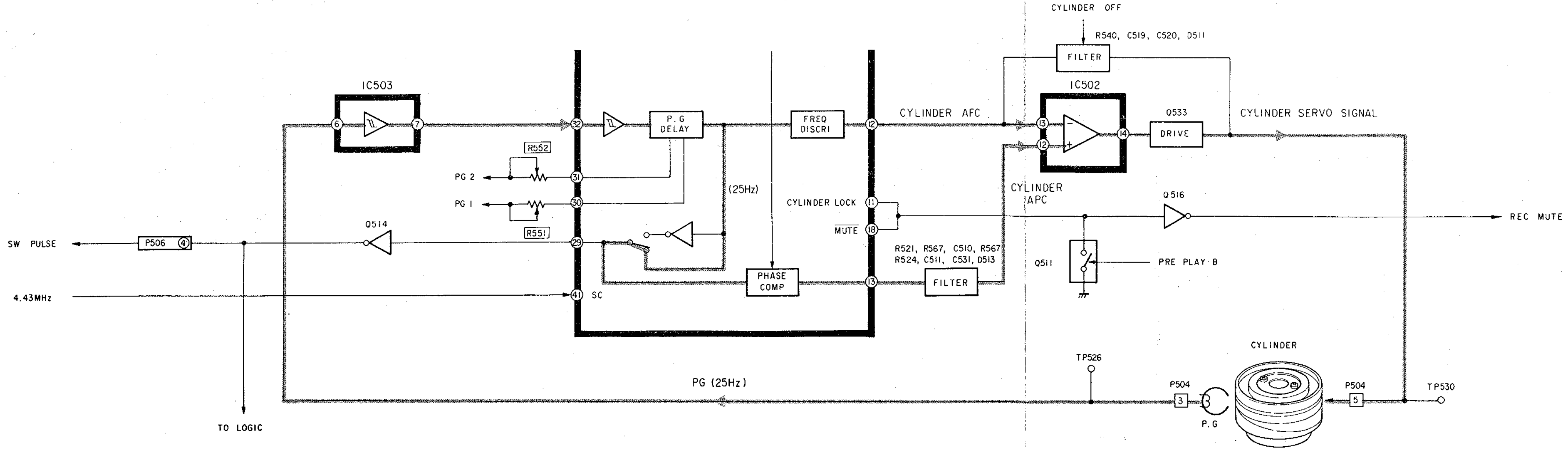


Fig. 4-5-2 Cylinder servo block diagram

2) The PG signal induced on the PG heads is waveshaped in the Schmitt circuit of IC503 (pins ⑤, ⑥, ⑦) and then sent to pin ㉜ of IC501. Each of PG 1 and PG 2 pulse is delayed by time constant circuits consisting of R551(VR), C503 and R552 (VR), C504, respectively. Each of the delayed output triggers flip-flops inside the IC, and develops at pin ㉙ as the SW pulse. The SW pulse is sent to the video circuit through the invertor Q514.

(2) Phase detection (APC), speed detection (AFC)

1) The phase detection and the speed detection are conducted inside IC501.
2) In the phase detection circuit, a rising edge of the switching pulse created from the PG pulse as previously described is compared with a reference signal (25 Hz) in their time difference (phase). In the record mode, a vertical sync signal (input to pin ㉕ of IC501) is counted down to half and the resultant signal is used as the reference signal.
3) On the other hand, in the playback mode the internal reference signal of 25Hz, which is created from the clock signal of 4.43 MHz (applied to pin ㊶ of IC501), is used as the reference signal. This is the only difference observed between the record and playback modes in the cylinder servo operation.
4) These reference signals are synchronized with rising edge of the delayed waveform at pin ㉗ (FP) of IC501.
5) In the speed detection circuit rising and falling time of the switching pulse (speed or time difference) is compared.
Results of the phase and speed detections are output from pins ⑬ and ⑫ of IC501 as 69 kHz rectangular pulse signals modulated in pulse width (PWM).
6) When the servo is locked under the stabilized condition, the PWM output shows about 50% duty, but when excessive speed and/or phase variations are caused the duty may vary considerably and in the worst case the duty becomes high or low.
7) However, if the rotating speed of the cylinder deviates considerably (in this case the AFC output becomes high or low) the duty of the APC output (Pin ⑬ of IC501) is maintained at 50%, so care must be needed.

(3) Phase compensation and output amplifier circuits

1) The output from pin ⑬ of IC501 passes through a filter (R524, C510, R567, R521, C511, C531) provided to stabilize the servo response and to filter the 69 kHz PWM carrier component and enters pin ⑫ of IC502, op-amplifier.
2) The double through diode D513 connected in parallel to R567 is provided to enhance quick charging or discharging of C511 and C531 in transient time period.
3) The AFC output from pin ⑫ of IC501 enters pin ⑬ of IC502, op-amplifier. The AFC output is fed back from the emitter of drive transistor Q533 with the carrier component removed by the feedback capacitor C519.
4) R540 and C520 determine the gain of the op-amplifier, at the same time, they constitute a filter for APC and AFC.
5) The op-amplifier output enters the base of drive transistor Q533 and drives the cylinder motor. To stop the cylinder motor approx. 3.5V is applied to the inverted input terminal of the op-amplifier through D511 to decrease the op-amplifier output to a low level.

(4) fH correction

1) In the cue/review mode, it is necessary to decrease or increase the rotating speed of the cylinder in response to the tape speed to keep relative tape speed between the cylinder and the tape at the specified value or to obtain constant horizontal sync frequency of 15.625 kHz.
2) Conventionally, this rotating speed control of the cylinder has been made by an external circuit, but in this model, the cylinder speed is automatically increased or decreased according to the speed control signal sent from the microcomputer to pins ⑧ – ⑩ of TD6360P, thereby performing the fH correction.

4-5-4 Capstan servo circuit

In the capstan system, tape is driven by rotating the capstan flywheel coupled to the Capstan motor through a belt. Fig. 4-5-3 shows the timing chart in record mode and Fig. 4-5-4 shows the timing chart in playback mode.

(1) FG signal generator

1) The FG signal is a signal obtained from the capstan flywheel as a speed feedback signal of the capstan.
2) A pulse generator consisting of a coil, magnet, and gears is provided inside the flywheel and is generating 240 pulses per one revolution of the capstan.
3) Generally, the FG frequency is 504 Hz when the servo is locked in the record or playback mode of operation.
4) These pulses are amplified by IC502 and then clamped by D510. The clamped output of approx. 1.4V square wave is fed to pin ⑤ of IC501.

(2) Speed detection (inside servo IC)

1) The FG signal entered pin ⑤ of servo IC501 is compared in its speed in the speed detector circuit and pin ⑮ develops a rectangular signal modulated with pulse width (PWM) of approx. 69 kHz. Since the capstan system is subject to more disturbance than the cylinder system, generally the AFC output has considerable duty variations under locked condition of the servo system.

(3) Phase detection (inside servo IC)

(RECORD mode):

1) The FG pulse signal entered pin ⑤ of IC501 is counted down to 1/24 to create 21 Hz pulse, and compared with the reference signal in their time difference (phase detection) in the phase comparator. The compared output is developed from pin ⑭ as a 69 kHz PWM signal.
2) The reference signal is the 21 Hz signal developed inside the IC for exclusive use of the capstan control and applied to pin ⑯ as a positive pulse signal.

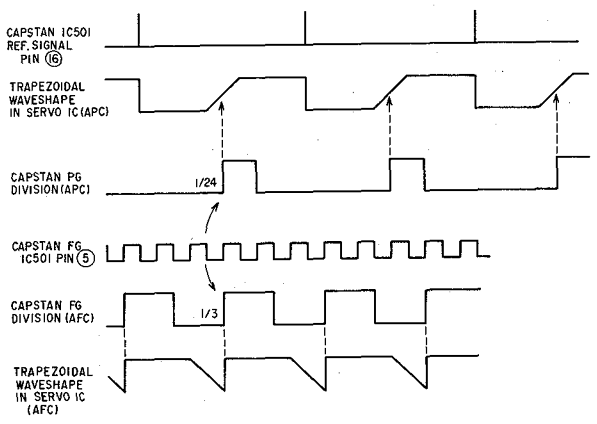


Fig. 4-5-3 Timing chart (Record mode)

(PLAY mode):

1) The reference signal delayed by a time equivalent to the time constant of R556 (main tracking), R553, C505 (subtracking) from the falling edge of the reference signal (pin ㉗ of IC501, delayed wave of FP) used as a reference for cylinder phase detection inside the IC and the CTL signal are compared in time (phase detection), and output from pin ⑭ as a PWM output.
2) With servo unlocked, the duty is also forced to 50% in both record and playback modes as in the cylinder servo system.

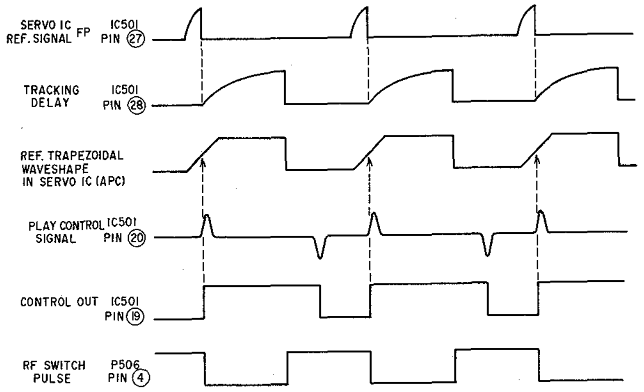


Fig. 4-5-4 Timing chart (Playback mode)

(4) Phase compensation & output amplifier circuits

1) The APC output developed at pin ⑭ of IC501 passes through the phase compensation filter (R525, C535, R571, R522, R528, R527, C512) and a smoothing circuit, and enters pin ⑩ of IC502.
2) A double throw diode D514 connected across R571 functions to speed up circuit response by rapidly charging or discharging C512 in a transient period.
3) The AFC output developed at pin ⑮ of IC501 is applied to pin ⑨ of IC502, equalized in a filter of C517, R530, smoothed with carrier components removed through C516, and then led to the transistor Q534 which drives the capstan motor. The capstan is stopped by turning Q505 on.

(5) Control (CTL) signal recording

1) In recording, 25 Hz control signal (CTL pulse) is created from the V sync signal (pin ㉕ of IC501). A current is alternately supplied from pins ㉒ and ㉓ of IC501 to the control head, and the current is recorded in saturation level on the control track. The current is limited to approx. 3mA by R514.
2) D508 connected to the op-amplifier input functions to clamp the control signal.
3) Duty of the record CTL pulse is determined by the tracking delay time at pin ㉘ of IC501 and has been set to approx. 75% by R513, R566 and C505.

(6) Playback CTL pulse amplifier circuit

1) In playback mode, pin ㉒ of IC501 is open and a bias voltage of approx. 2.2V is developed at pin ㉓ of IC501 to bias one end of the CTL head.
2) A fine level signal appears on the control head as the tape travels, and enters pin ⑥ of IC502 and amplified by approx. 60dB.
3) The amplified output enters pin ⑳ of IC501 and furthermore amplified, wave-shaped by the Schmitt amplifier inside the IC. Thus amplified output is used for phase detection.
4) On the other hand, the wave-shape pulse develops at pin ⑲ and enters pin ② of P506.
5) D505 and R562 operate to clamp 12Vp-p (voltage induced on the CTL head is amplified by the op-amplifier) to approx. 4V for protecting the input circuit of the IC.

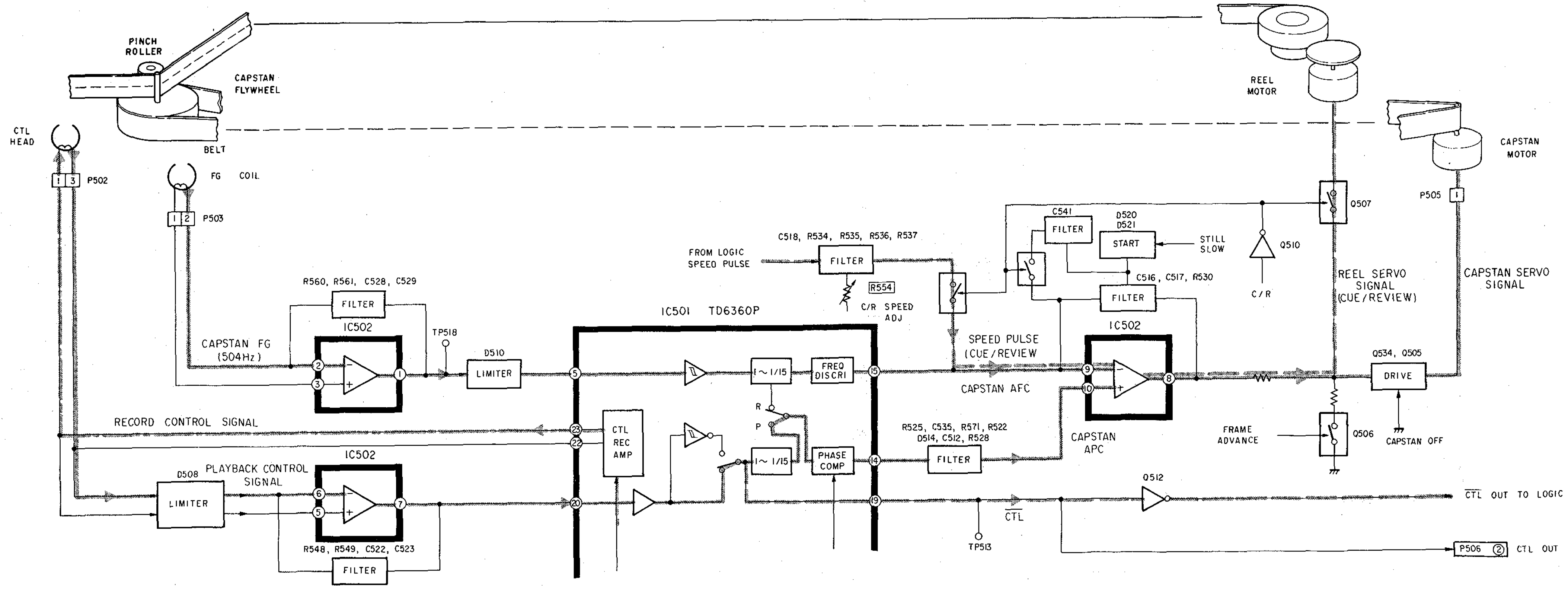

PINCH ROLLER
CAPSTAN FLYWHEEL
BELT
CTL HEAD
P502
FG COIL
P503
R560, R561, C528, C529
FILTER
IC502
CAPSTAN FG (504Hz)
TP518
D510
LIMITER
RECORD CONTROL SIGNAL
D508
PLAYBACK CONTROL SIGNAL
LIMITER
IC502
R548, R549, C522, C523
FILTER
IC501 TD6360P
CTL REC AMP
1~1/15
FREQ DISCRI
R
P
1~1/15
PHASE COMP
FROM LOGIC SPEED PULSE
C518, R534, R535, R536, R537
FILTER
R554
C/R SPEED ADJ
SPEED PULSE (CUE/REVIEW)
CAPSTAN AFC
R525, C535, R571, R522
D514, C512, R528
FILTER
CAPSTAN APC
CTL
TP513
C541
FILTER
D520
D521
START
STILL SLOW
C516, C517, R530
FILTER
IC502
Q510
C/R
REEL MOTOR
Q507
REEL SERVO SIGNAL (CUE/REVIEW)
CAPSTAN MOTOR
P505
CAPSTAN SERVO SIGNAL
Q534, Q505
DRIVE
FRAME ADVANCE
Q506
CAPSTAN OFF
Q512
CTL OUT TO LOGIC
P506 ②
CTL OUT

Fig. 4-5-5 Capstan servo block diagram

(7) Still noise shifting

1) A simple pulse drive type still & slow functions capable of freezing a picture at a given position are provided, but no noise shifting circuit which moves undesirable noise bars to a less susceptible position on a screen is provided.
2) With the still or slow mode set, the logic circuit sends a still/slow signal (LOW) and a voltage at pin ⑨ of IC502 is turned to LOW by D520, D521 connected in parallel with the feedback capacitor (C517) of a filter in the capstan system, and the op-amplifier's output (pin ⑧ of IC502) becomes HIGH.
3) In the still mode Q505 turns on and in the slow mode Q506 turns on. As a result, the op-amplifier output is divided by R542, R543, and R544, and as Q505 is turned on or off repetitively the capstan motor is driven repetitively.
4) The slow speed is set to 1/10 through 1/20 times the normal speed.
5) The still & slow signal is also developed for transitional period from the picture search/stop to the playback mode. D509 and R539 function to provide almost the same bias voltage as in the play mode across C517 to assure rapid mode transition.

(8) Cue/Review

1) In the cue/review mode, tape is driven by a reel motor and the tape speed is controlled by detecting the control (CTL) pulses and by controlling its frequency.
2) In the cue/review mode, the CTL pulse enters pin ⑳ of IC501 and outputs from pin ⑲ as a square wave signal. This signal is inverted ($\overline{\text{CTL}}$) and applied to pins (55), (56) of IC601 logic microcomputer. Then, pin ⑯ develops a rectangular signal in synchronization with falling edge of the $\overline{\text{CTL}}$ pulse. A part of HIGH in the signal developed at pin ⑯ is a time depending upon the ROM of the logic microcomputer and set so that the playback CTL frequency becomes approx. 179 Hz in the cue mode and approx. 170 Hz in the review mode.
3) Since the normal playback CTL frequency is 25 Hz, the cue/review operation is conducted at a speed of approx. 7 times the normal speed.
4) The playback CTL signal frequency is different in the cue and review modes. The reason is as follows: To make fH correction the rotating speed of the cylinder is increased in the cue mode and is decreased in the review mode, as a result if the CTL frequency does not match to 7 times the cylinders' rotating speed, motion of noise bars increases, thus disturbing screen image. To prevent this the different CTL frequency is used for each mode.
5) The output developed at pin ⑯ of IC601 is smoothed by a LPF consisting of R535, R536, R537, R554 (VR), and C518, and its integrated value is compared with a reference voltage determined by resistor division ratio of R522 and R528. The resultant error voltage is output from pin ⑧ of IC502 and is sent to the drive transistor Q625 in passing through Q507 which is turned on.
6) In this way the AFC servo functions with the CTL pulse recorded on the tape.

(9) Synchronous editing

1) Purpose of the synchronous editing is to not disturb continuity of the CTL pulse. To realize this, a slight amount of tape is rewound by driving the reel motor with pulse voltage immediately after the operation mode is changed from record to the record pause mode, and then the unit enters the standby mode.
2) At the same time, the servo IC is also set to the edit mode but in this mode the CTL pulse is set to the playback mode and the IC itself is also in the playback condition.
3) When the pause mode is released, the tape is reproduced for 1.7 sec to match phase of the CTL pulse and then the unit enters the record mode.

4-6. Video Circuit

4-6-1 Outline

The video circuit consists of 8 ICs in total. This unit features good cost performance and various user controls including picture sharpness control to provide easy-to-use full functions.

Operations and functions for each IC used are shown in Table 4-6-1.

Table 4-6-1

Part No.	IC	Operation	Function
IC101	TA7772P (16 pin DIP)	Record amplifier Playback RF process	Record amplifier circuit, Low noise high gain head amplifier circuit, REC/PLAY switching, CH-1/CH-2 switching
IC121	TA8607P (16 pin DIP)	Playback RF process	AGC, Drop-out compensate circuit, Phase equalizing circuit
IC122	TA7302P (7 pin SIP)	Limitter	Limitter circuit
IC201	TA8605N (30 pin small package)	Y signal process FM MO/DEM	Sync AGC, Peak AGC, Sync clamp, Feedback clamp, FM modulation, Sync separation circuit, REC/PLAY switching, Main emphasis, White/dark clip, Double limitter circuit, Playback Y/C mixing, False V inserting
IC202	TA8606N (24 pin small package)	Y signal process Sub-emphasis	Non-linear sub-emphasis, 1/2 fH shift, Sharpness control circuit, Noise canceller
IC401	BA7267S (22 pin small package)	Color signal process	REC/PLAY switching, Burst ACC, Frequency CONV I, 4.43 MHz X'tal OSC (XO), Voltage control X'tal OSC (VXO), ACK, 321fH/320fH VCO, APC detect circuit, Frequency CONV II
IC402	BU2763S (18 pin small package)	Digital color signal process	Color rotary circuit, Side lock detection circuit, DPLL circuit AFC detect circuit, Digital phase locked loop, Burst gate pulse generation circuit, 1/320 · 1/321 divider circuit, REC/PLAY switching circuit
IC481	BA7025L (18 pin SIP)	PAL/SECAM defector	PAL/SECAM defector

4-6-2 Record Circuit

(1) Y-signal record circuit

1) A composite video signal selected from either one of the line input or the tuner input circuit by the Phono jack switch P210 (line input has priority over the tuner input) is applied to pin ④ of IC201 as well as to the color process circuit.

2) The composite video signal entered pin ④ of IC201 is subject to gain control and fed back clamp operations in the sync AGC and the peak AGC circuits, and then outputs from pin ⑩ of IC201 as an EE output signal and from pin ① as a record Y signal.

3) The EE signal at pin ⑩ is led to the line output terminal (P211). At the same time the EE signal is subject to an attenuation and the signal is applied to the RF modulator through Q206 buffer.

4) While the signal output from pin ① enters the LPF (Z202). The LPF removes color components from the input signal and the signal (Y signal) with color components removed passes the buffer amplifier Q208 and enters pin ③ of IC202 and the AGC detector circuit through pin ㉙ of IC201.

5) The Y signal entered pin ③ of IC202 is subject to a sync tip clamp. At the same time the Y signal outputs from pin ㉔ of IC202 as a sync separation signal. The signal enters pin ㉗ of IC201 through a LPF and becomes as a composite sync signal with the sync signal separated. The composite sync signal outputs from pin ㉕ and enters pin ⑭ of IC402 and used to create fH reference for color process and burst gate pulse.

6) The composite sync signal is also applied to the vertical sync separation circuit in the servo circuit and processed to develop the V-sync signal. The V-sync signal is used as a reference signal in the servo circuit during record operation.

7) Moreover, the composite sync signal is used for sync clamp operation in the AGC detector inside the IC201 or for sync clamp operation of playback Y signal in the playback mode, and applied to sync AGC detector as keyed pulse after it is delayed and waveshaped.

8) The Y signal, which is entered pin ③ of IC202 and subject to the sync tip clamp, outputs from pin ⑮ after it is subject to the non-linear pre-emphasis (sub-emphasis) and 1/2fH shift. The non-linear emphasis is the emphasis where the emphasis level is increased as the signal amplitude decreases to prevent lowering of S/N.

9) 1/2 fH shift means to increase FM carrier frequency for CH-1 by 1/2 fH to convert vertical stripes into diagonally crossed stripes to make the stripes less perceptible on the screen. In practice, video signal's DC level is shifted by the amount equivalent to 1/2 fH in the FM carrier frequency.

10) The non-linear emphasis operation is performed as follows:
High frequency components are extracted from the Y signal developed at pin ⑲ with a filter consisting of R234, L204, and then applied to the original signal after the extracted signals are compressed so that the higher the amplitude of the signals, the more the signals are compressed inside the IC.

11) The 1/2 shift operation is conducted inside the IC and is controlled by the state of pin ⑯ . ("H" for CH-1 mode, and "L" for CH-2)

12) The Y signal output from pin ⑮ of IC202 directly enters pin ⑫ of IC201 and is subject to the pre-emphasis (main-emphasis) by R222, R223 and C225. The signal is then subject to the white clip and dark clip to prevent overmodulation. Thus processed signal outputs from pin ⑯ and enters the FM modulator (pin ⑱) in passing through the deviation adjustment control (R252). FM carrier frequency adjustment control (R251) is also connected to pin ⑱ .

13) The FM modulator modulates the sync tip level to 3.8 MHz and 100% white level to 4.8 MHz. Thus, created Y-FM signal outputs from pin ㉑ of IC201 and enters the record Y-FM equalizer (Q123) where the signal is processed to have an emphasis characteristic over a lower frequency band and to have a high-pass characteristic for the down converted color signal to be superimposed. The signal is then sent to the Y/C MIX AMP consisting of Q124, and Q125.

14) Q129 functions as a record muting circuit.

15) The signal superimposed with the down converted color signal in the Y/C MIX AMP passes Q126 buffer and pin ⑤ of P202, and enters pins ⑪ and ⑮ of IC101 record amplifier on the PRE AMP unit, and amplified.

16) The amplified record current developed from pins ③ and ⑤ enters the video heads through the rotary transformer.

(2) Color signal record circuit

1) A video signal passed through the built-in switch of jack P210, and is selected by REC/PLAY switches (Q403 and Q404). The selected output enters the ACC amplifier through a BPF and pin ㉒ of IC401. The ACC amplifier is fed to the burst ACC circuit which keeps the burst level at a constant value in the record mode. That is, the ACC amplifier operates to increase the ACC output level as a color signal decreases, thus increasing a relative color recording current or S/N even if the color signal level is low.
2) The color signal with its amplitude stabilized in this way by the ACC amplifier outputs from pin ㉑ , and enters pin ⑳ . Then the signal is applied to the main BM (Balanced Modulator).
3) The 4.43 MHz color signal applied to the BM is mixed with 5.06 MHz carrier (the phase of which is fixed at the CH-1 and shifted at the CH-2) being applied to the BM, thus frequency conversion of 5.06 ±4.43 MHz will be performed. The converted outputs developed pin ⑭ are led to two LPFs to extract only a lower component of 627 kHz (= 5.06 MHz −4.43 MHz = (40 + 1/8)f_H) color signal. Thus created color recording signal is adjusted in its current level and passes through the group delay circuit (Q405, Q406) and then fed to the Y/C mixer circuit (Q124, Q125) and sent to the record amplifier IC101.
4) The composite sync signal entered pin ⑭ of IC402 becomes a HD pulse with its equalizing pulses removed. AFC detection is performed with this HD pulse and the f_H signal created by counting down the 321f_H VCO output (pin ② of IC402) to 1/321 to control the VCO or to lock the VCO to 321f_H (=5.015 MHz) precisely.
5) The VCO output counted down to 1/8 or (40 + 1/8)f_H (= 627 kHz) carrier is phase-shifted using the f_H pulse stabilized in the DPLL (Digital Phase Locked Loop) as a trigger pulse. The rotational direction of the Phase Shifter (PS) depends upon the head switching pulse applied to pin ⑥ of IC402. When the switching pulse is in the "H" level, the phase is fixed and in the "L" level, the phase delaies by 90° every 1H. Thus created 40 1/8f_H PSCC (Phase Shifted Sub-Carrier) develops at pin ⑯ of IC402, and enters a LPF to remove harmonics included. Then the signal enters the sub BM from pin ⑨ of IC401.
6) Since 4.43 MHz carrier, which is locked to the color burst frequency by the record APC signal, is being applied to the sub-BM, the PSCC signal is converted to 4.43 MHz ±627 kHz and outputs from pin ⑦ of IC401. This output enters the BPF and the BPF extracts 5.06 MHz (= 4.43 MHz + 627 kHz) component. Thus converted 5.06 MHz signal is used as the carrier signal to down-convert the color signal.

4-6-3 Playback circuit

(1) Y signal playback circuit

1) Signals reproduced by video heads are applied to pin ⑥ (CH-2) and pin ② (CH-1) of IC101, pre-amplifiers. The preamplifiers amplify these signals by approx. 60 dB. These signals are switched by switching pulses and output from pin ⑩ .
2) The playback signal developed at pin ⑩ passes a buffer amplifier Q102 and pin ③ of W102, and returns to the main unit. Then the signal enters pin ⑨ of IC121, amplified by approx. 13 dB, and outputs from pin ⑪ .
3) The playback RF signal output from pin ⑪ enters the equalizer circuit and the color signal playback circuit. At the same time the RF signal output also enters the servo unit as a playback envelope output (TP101).
4) The equalizer circuit functions to make the video frequency response flat with the PRE-SET control R259 for sharpness adjustment, thus preventing possible overmodulation due to parameter spread of the video heads.
5) Thus processed signal passes the LPF and the high frequency noises are removed. Then, the signal enters pin ⑫ of IC121 in passing through a trap and the down converted color signal component is removed. The signal then passes through pins ③ and ⑤ of the FM phase compensation circuit and enters the AGC circuit through pin ② . Thus processed playback RF signal with its amplitude adjusted to a specified level outputs from pin ⑯ and enters the double limiter.
6) The FM phase compensation circuit functions to reduce phase distortion observed at around the Y-FM carrier signal which has been subject to frequency compensation.
7) On the other hand, the playback Y-FM signal enters the dropout detection circuit inside IC121. The detection circuit develops a dropout detection pulse at pin ⑮ when an envelope output reduces. The dropout detection pulse is used to switch in the signal at pin ⑭ which is delayed by 1H glass delay line, thus performing the dropout compensation.
8) The AGC output at pin ⑯ of IC121 passes the LPF consisting of R146, R147, C144, R148, and C145, and enters pin ⑲ of IC201. At the same time the same signal also passes the HPF consisting of C147, R149, C148, and R160 and enters pin ① of IC122, limiter. The limited output develops from pin ⑥ of IC122 and enters pin ⑰ of IC201 where the signal is sent to the FM demodulator through a double limiter. The limiter inside IC122 is used to compensate insufficient gain of the limiter in IC201 to improve over-modulation characteristic.

9) The FM demodulator consists of a non-stable multivibrator and a multiplier, and the demodulated output is led to pin ① through a LPF (Z202).

10) Thus demodulated Y signal is then subject to edge expander and white clip circuit consisting of Q218 to Q221. This circuit improves edge waveform of Y signal. R256 adjusts the playback Y signal level to a constant level. Q207 functions to raise higher frequency (approx. 2.8 MHz) level. The signal is subject to main de-emphasis operation in the de-emphasis circuit consisting of R227, R229, C229 and C248. The signal is then applied to pin ㉑ of IC202.

11) The signal amplified by approx. 20 dB inside IC202 is subject to non-linear de-emphasis and to 1/2 f_H shift restoration and then signal outputs from pin ⑭ . The non-linear de- emphasis is performed as in the record mode. That is, high frequency components of the signal are applied to pin ⑱ , compressed, and then subtraction is conducted in reverse as in the record mode.

12) The Y signal restored to the original recorded signal enters pin ⑬ and is led to the sharpness adjustment circuit inside IC202. A DC voltage applied to pin ⑦ controls the picture sharpness and the controlled signal outputs from pins ⑥ and ⑧ and the both are mixed then enters pin ⑤ again, then applied to the noise canceller circuit.

13) The noise canceller circuit extracts only high frequency components from the signal at pin ㉔ with the HPF consisting of C229, C228, L207, and R231, and supplies them to pin ㉓ to take out only the noise components with the limiter. Thus developed noise signals are subtracted from the original signal (same signal at pin ㉔) to cancel the noises each other. The signal at pin ㉔ is also used as a signal for sync separation as in the record mode and is led to pin ㉗ of IC201.

14) The Y signal with its high frequency noises removed in this way outputs from pin ① and enters pin ⑥ of IC201. The Y signal is subject to a sync clamp operation in this stage and then mixed with a playback color signal being applied to pin ⑧ of IC201, resulting in a video signal of 2Vp-p. The video signal outputs from pin ⑩.
Operations in following stages are the same as those in the record mode, so description will be omitted.

(2) Color signal playback circuit (PAL/SECAM)

1) A playback RF signal developed at pin ⑪ of IC121 passes through amplifier Q128 and LPF and the down converted 627 kHz color signal contained in the RF signal is separated.

2) Then the color signal enters the ACC amplifier from pin ① of IC401 to stabilize the level.

3) Thus stabilized 627 kHz down converted color signal outputs from pin ㉑ of IC401 and enters the main BM through pin ⑳ of IC401. In the main BM, the 627 kHz color signal is mixed with 5.06 MHz carrier signal (with the phase shifted) being applied to the BM and frequency conversion of 5.06 MHz ±627 kHz is performed.

4) In this case, as the phase of 5.06 MHz signal is preset by the APC loop so that horizontal jitter components caused by the rotational system of the mechanism are cancelled each other, the converted color signal has almost no jitter components.

5) The color signal with the jitter component removed in this way outputs from pin ⑯ . The color signal enters 2H comb filter (X401) to remove its crosstalk components from adjacent tracks at PAL mode and enters an attenuator at SECAM mode. The color signal, then, pass through the REC/PLAY switch of Q404, and is amplified. The amplified output enters pin ㉒ of Q401 in passing through a BPF (4.43 MHz) and outputs from the pin ⑭ .

6) The output at pin ⑭ is generally biased by approx. 2V DC, but the DC component becomes zero when the color killer circuit functions. The playback color signal at pin ⑭ passes through Q407 buffer and is adjusted in its color level, and then enters the Y/C MIX circuit from pin ⑧ of IC201 and mixed with the playback Y signal. The mixed output is obtained at pin ⑩ .

7) In the playback mode, the color sync circuit system operates as follows:

8) A composite sync signal separated from a playback Y signal develops at pin ㉕ of IC201 and enters pin ⑭ of IC402. A burst gate pulse is created from the composite sync signal (output from pin ⑱ of IC402), and applied to pin ⑥ of IC401.

9) A burst section of the playback color signal is sampled with this burst gate pulse and compared with the 4.43 MHz reference signal. The resultant error signal controls the 321fH VCO so that its phase is locked. In this case, a stable point of the APC exists every period of fH because of the burst gate synchronization performed every 1H, so it may be possible for the VCO to be locked at a frequency other than 321fH.

10) To prevent this, a HD pulse created from the composite sync signal at pin ⑭ of IC402 and the VCO output fed through pin ② are compared in their frequencies to develop a side lock detection pulse that functions to correct the frequency deviation to 321fH when the VCO is locked at a frequency other than 321fH.

11) The VCO output of 321fH is counted down to 1/8 or to (40 + 1/8)fH as in the record mode and then subject to the phase-shift.
The (40 + 1/8)fH signal and the 4.43 MHz reference signal are mixed in the sub-BM circuit and a 5.06 MHz carrier signal is generated.

12) The 5.06 MHz carrier and the 627 kHz color signal are applied to the main BM and demodulated to a 4.43 MHz color signal. In this case, amount of phase shift and rotational direction of phases of 627 kHz color signal and 5.06 MHz carrier signal become the same. That is, the color signal is demodulated correctly with the phase relation returned to that of the original signal.

13) On the other hand, crosstalk components from adjacent tracks are demodulated with their phases rotated in 90° shift direction. As a result, phase rotation of 4.43 MHz crosstalk component becomes 90° x 2 = 180° every 2H or the phase is inverted. Thus, they can be removed by the 2H comb filter.

4-6-4 PAL/SECAM identification circuit

1) In the REC/EE mode, the color signal from pin ㉑ of IC401 is applied to pin ④ of IC481. At the same time, a burst gate pulse from pin ⑱ of IC402 is entered pin ⑤ of IC481.

2) The color signal applied to pin ④ of IC481 is gated only for the burst period and output from pin ⑦ with the amplitude limited by the limiter amplifier.

3) The output from pin ⑦ will be processed in different ways depending upon the PAL or SECAM system as explained below:

4) (SECAM signal)
For the SECAM signal, one of signals with different frequencies of (DR = 4.40MHz) and (DB = 4.25MHz) is alternately applied every 1H to the bandpass filter. Since the filter has been designed to pass 4.25MHz component and to attenuate 4.40MHz, the 4.40MHz signal has a lower amplitude than that of 4.25MHz signal.

5) Accordingly, the frequency difference between DR and DB is expressed in the amplitude difference. That is, a signal alternately showing a large and a small amplitude is developed every 1H. The signal is applied to pin ⑨ and detected in amplitude, and then led to the resonant circuit consisting of L451 and C485 between pins ⑪ to ⑬.

6) Since the resonant frequency is set to fH/2 and the signal alternately showing a different amplitude every 1H has a period of 2H (= fH/2 frequency), a resonant waveform will be obtained at pin ⑪. The waveform output is converted into a DC voltage in the comparators 1 & 2, and output as a high level signal identifying the SECAM signal. The output voltage is called SECAM + B.

7) (PAL signal)
Since the gated PAL signal includes only 4.43MHz component, the Band Pass Filter develops the output having a constant amplitude. Accordingly, if the output is applied to the resonant circuit, no resonant waveform output will be obtained. Thus the comparators 1 & 2 do not develop any DC output. That is, the PAL signal is not identified as the SECAM signal and pin ⑯ develops 0V output.

8) During playback mode, the color signal from pin ㉒ of IC401 is applied to pin ① of IC481 and the PAL/SECAM identification is performed in the same way.

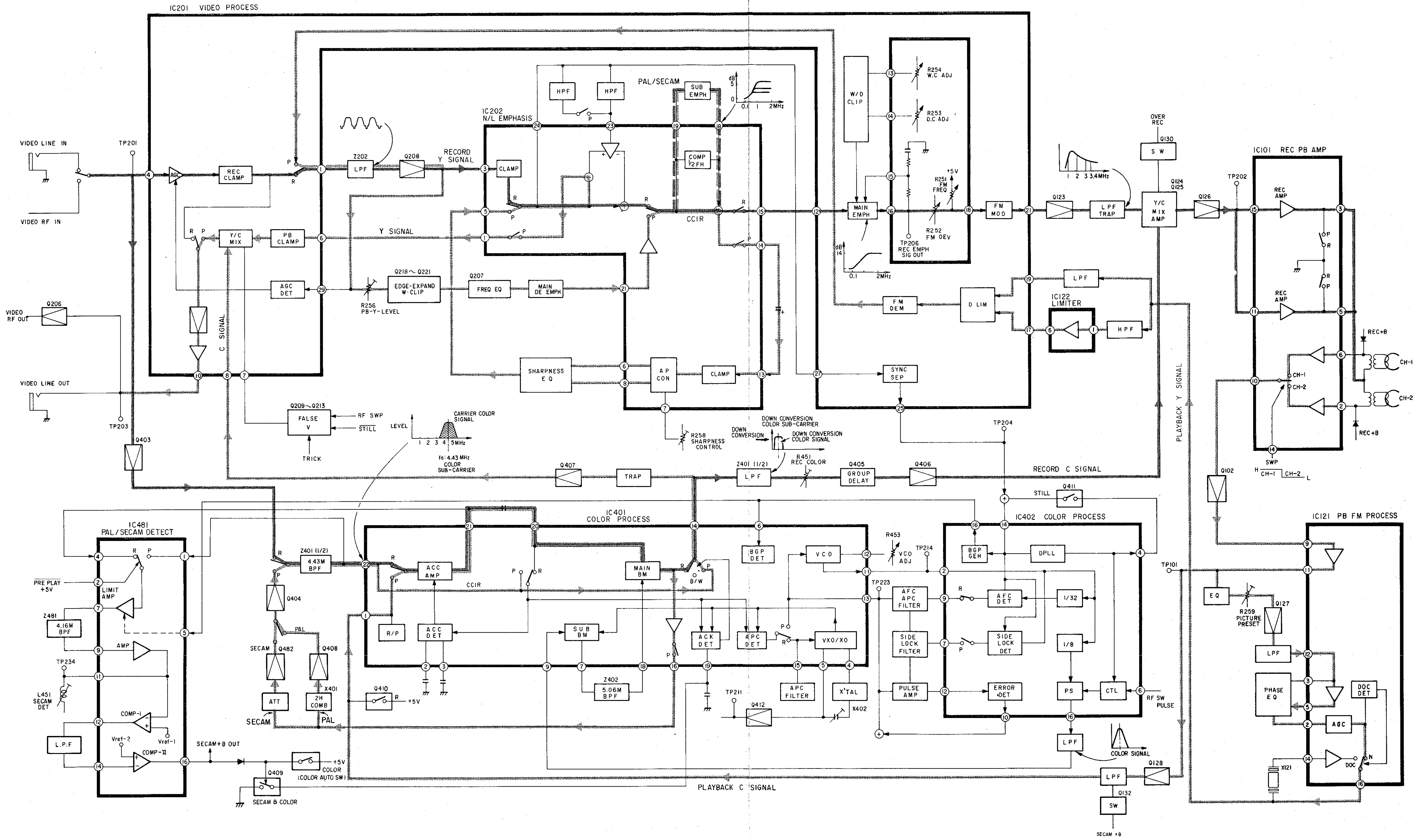

IC201 VIDEO PROCESS
VIDEO LINE IN
VIDEO RF IN
TP201
AGC
REC CLAMP
Y/C MIX
PB CLAMP
AGC DET
VIDEO RF OUT
Q206
C SIGNAL
VIDEO LINE OUT
TP203
Q403
Z202
LPF
Q208
RECORD Y SIGNAL
Y SIGNAL
Q218 ~ Q221
EDGE-EXPAND W-CLIP
R256 PB-Y-LEVEL
Q207
FREQ EQ
MAIN DE EMPH
Q209 ~ Q213
FALSE V
RF SWP
STILL
TRICK
IC202 N/L EMPHASIS
CLAMP
HPF
PAL/SECAM
SUB EMPH
COMP 1/2 FH
CCIR
SHARPNESS EQ
AP CON
R258 SHARPNESS CONTROL
W/D CLIP
R254 W.C ADJ
R253 D.C ADJ
MAIN EMPH
R251 FM FREQ
R252 FM DEV
TP206 REC EMPH SIG OUT
FM MOD
FM DEM
D LIM
IC122 LIMITER
SYNC SEP
Q123
LPF TRAP
OVER REC
Q130
SW
Q124 Q125
Y/C MIX AMP
Q126
TP202
IC101 REC PB AMP
REC AMP
REC+B
CH-1
CH-2
SWP
PLAYBACK Y SIGNAL
LEVEL
CARRIER COLOR SIGNAL
fo: 4.43 MHz COLOR SUB-CARRIER
DOWN CONVERSION COLOR SUB-CARRIER
DOWN CONVERSION COLOR SIGNAL
R451 REC COLOR
Q407
TRAP
Z401 (1/2)
Q405
GROUP DELAY
Q406
TP204
RECORD C SIGNAL
Q411
IC481 PAL/SECAM DETECT
PRE PLAY +5V
LIMIT AMP
Z481 4.16M BPF
AMP
TP234
L451 SECAM DET
COMP-I
COMP-II
Vref-1
Vref-2
L.P.F
SECAM+B OUT
Q409
SECAM & COLOR
COLOR (COLOR AUTO SW)
4.43M BPF
Q404
SECAM
Q482
PAL
Q408
X401
ATT
2H COMB
Q410
+5V
IC401 COLOR PROCESS
ACC AMP
R/P
ACC DET
SUB BM
MAIN BM
B/W
Z402 5.06M BPF
BGP DET
ACK DET
APC DET
VCO
R453 VCO ADJ
TP214
TP223
VXO/XO
APC FILTER
X'TAL
X402
TP211
Q412
IC402 COLOR PROCESS
BGP GEH
DPLL
AFC APC FILTER
AFC DET
1/32
SIDE LOCK FILTER
SIDE LOCK DET
1/8
PULSE AMP
ERROR DET
PS
CTL
RF SW PULSE
COLOR SIGNAL
Q128
Q132
SECAM +B
PLAYBACK C SIGNAL
TP101
Q102
IC121 PB FM PROCESS
EQ
R259 PICTURE PRESET
Q127
PHASE EQ
DOC DET
AGC
DOC
X121

Fig. 4-6-1 Video block diagram

4-7. Audio Circuit

4-7-1 Outline

1) The audio circuit is mounted on the main P.C. board and employs a monaural system.

2) Major blocks in the audio circuit are the audio 1 chip IC (containing ALC, line-amplifier, record amplifiers, equalizer amplifier, muting circuit, etc.) erase oscillator circuit, etc.

4-7-2 EE mode circuit description

(1) Input signal switching (P710)

1) Input signal switching is performed by the built-in switch of the audio line input jack (P710).

2) A line input is selected when a line input plug is inserted to the jack, and the tuner input is selected when no plug is connected.

3) The nominal line input level is –10 dBs (245mV-rms).

(2) Record & play back switching circuit and muting circuit (IC701)

1) The record & play back switching circuit and the muting circuit are provided inside IC701.

2) The record & play back switching circuit becomes a play back mode when PB+B (HIGH) is applied to pin ㉑ of IC701 and becomes EE or record mode when LOW level voltage is applied.

3) The muting circuit mutes a playback signal when HIGH level signal is applied to pin ⑳ of IC701. (The muting circuit only works in trick playback modes.)

(3) Output amplifier (IC701)

1) The signal entered pin ⑪ of IC701 is amplified by approx. 35 dB and outputs from pin ⑬. The output is applied to the line output terminals as well as to the RF modulator.

2) The nominal output level is –7 dBs (350 mVrms).

(4) ALC circuit (IC701)

1) The ALC circuit is also contained inside the IC701.

2) The signal entered pin ⑪ of IC701 is amplified by approx. 35 dB and outputs from pin ⑬.

3) When the output at pin ⑬ exceeds –4.5 dBs , a detector circuit inside the IC automatically functions and adjusts the line amplifier input level to an optimum level.
As a result, the output level is automatically adjusted so that the audio head does not cause any distortion if a signal higher than the reference input level is applied.

4) The ALC operates only in record mode and the EE mode.

4-7-3 Record circuit

(1) Record amplifier circuit (IC701)

1) The signal developed at pin ⑬ of IC701 enters pin ⑮ in passing through the record equalizer consisting of R710, R711, R724, C722. The record equalizer attenuates signals lower than 1 kHz by approx. 1 dB and prevents frequency peak over mid to high frequency range.

2) The signal applied to pin ⑮ is amplified by approx. 11 dB (400 Hz) in the record amplifier, outputs from pin ⑱ , and enters the audio head through the constant current resistor (R713).

3) Pin ⑰ is a feedback terminal for the record amplifier and constitutes a high frequency peaking circuit.

4) L701 and C713 function as a peaking circuit and rises signal level by approx. 8 dB at 12 kHz.

(2) Erase oscillator circuit (Q705, T701)

1) The oscillator circuit consisting of Q705 and T701 works during record mode, and oscillates frequency of approx. 68 kHz.
The oscillator signal is used as the erasing current for the full width erase head and the audio erase head as well as a record bias for recording of audio signals.

(3) Audio head switching circuit (IC702)

1) IC702 grounds its pins ③ and ① when a voltage is applied to pins ⑤ and ⑦ , respectively. In the EE and record modes pin ③ grounds the playback terminal of the audio head through a fine resistance and opens only in the playback mode, thus allowing the playback signal to enter pin ④ of IC701.

2) Pin ① opens only in the record mode thus allowing record signals and bias signal to flow to the audio head.

3) In the playback mode, the record signal terminal of the audio head is grounded.

4-7-4 Playback circuit

(1) Playback amplifier (IC701)

1) A playback signal induced on the audio head is first adjusted in its frequency response in the peaking circuit consisting of the head coil and C704 and then applied to pin ④ of IC701. The IC704 amplifies the signal by approx. 45 dB at 400 Hz and feeds the output to pin ⑧.

2) Pin ⑦ of IC701 functions as a negative feedback terminal and adjusts the frequency response with the impedance connected between pin ⑦ and pin ⑧ . That is, an equalizing response showing a descending response from a low end (approx. 50 Hz) to mid range (approx. 1.3 kHz) and a flat response over a higher frequency range is provided.

3) The signal processed in this way enters pin ⑩ in passing through the playback level adjusting control (R751), selected by the switch, amplified, and then applied to the output terminals as described in 4-7-2 (2), (3).

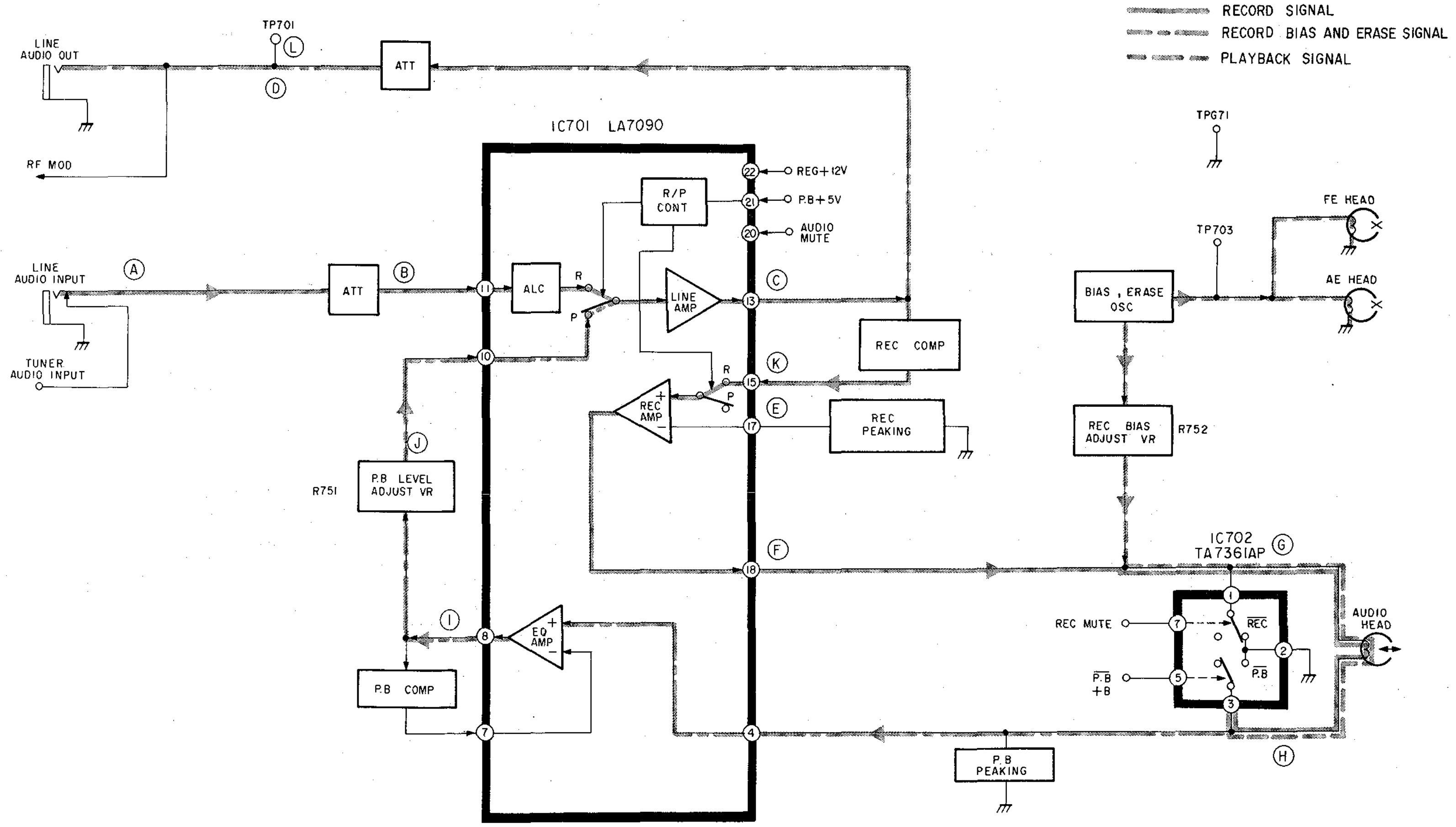


Fig. 4-7-1 Audio block diagram

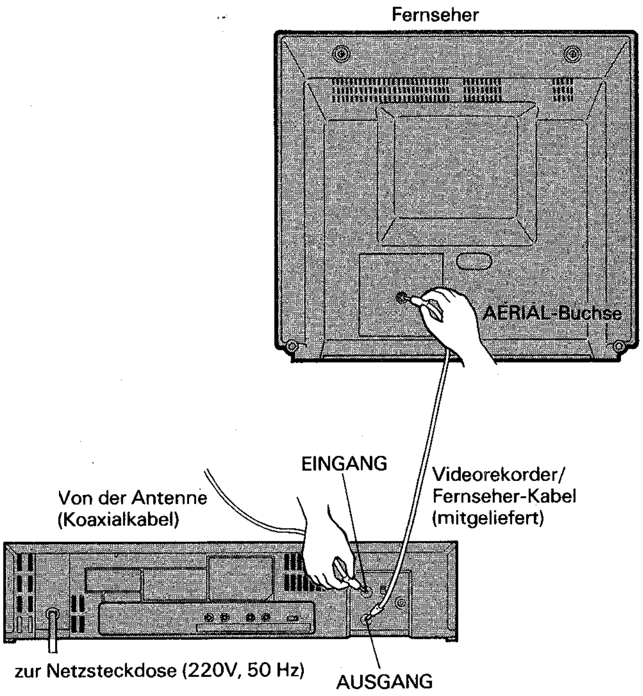
ANSCHLÜSSE

ANSCHLUß DER FERNSEHANTENNE

Die Antennenleitung vom Fernseher abtrennen und an der Antennen-Eingangsbuchse (EINGANG) ㊼ an der Rückseite des Rekorders anschließen.

ANSCHLUß DES VIDEOREKORDERS AN DEN FERNSEHER

Ein Ende des mitgelieferten Kabels an die Antennenbuchse des Fernsehers und das andere Ende an die Antennen-Ausgangsbuchse (AUSGANG) ㊽ an der Rückseite des Rekorders anschließen. Dieses Kabel hat verschiedene Stecker, nur einer paßt in die Antennenbuchse des Fernsehers.

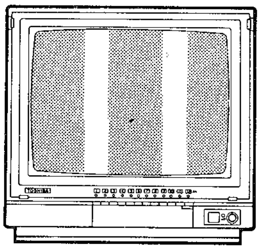


NORMALES FERNSEHEN

Den Fernseher einschalten und den Fernseher auf den gewünschten Kanal einstellen. (Für normales Fernsehen braucht der Videorekorder nicht eingeschaltet zu werden.)

EINSTELLUNG DES FERNSEHERS AUF DEN VIDEOREKORDERAUSGANGSKANAL

1. Den Fernseher einschalten.
2. Die Betriebstaste (BETRIEB) ❸ des Videorekorders einschalten.
3. Den Testsignalschalter (TEST SIGNAL) ㊾ auf „EIN" stellen.
   (Jetzt liefert der Videorekorder ein Testsignal zum Fernseher. Das Testsignal ist auf einem Kanal zwischen 31 und 39.)
4. Den Fernseher auf den Videorekorderkanal einstellen. Den Kanal abstimmen, bis das unten gezeigte Schwarzweiß-Testmuster klar wiedergegeben wird. Für die Wiedergabe einer Videokassette muß der Fernseher jetzt immer auf diesen Videorekorderkanal eingestellt werden.



Hinweis: Das Tonsignal (1-kHz-Rechteckwelle) wird mit dem Bild ausgegeben.

5. Gelegentlich treten Interferenzstörungen von benachbarten Fernsehkanälen auf. Diese Störungen können beseitigt werden, indem der Ausgangskanal des Videorekorders mit dem UHF-Kanalregler (KANAL) ㊿ an der Rückplatte anders eingestellt wird.
   Anschließend muß der Fernseher auf den neuen Videorekorderkanal eingestellt werden.
6. Den Testsignalschalter (TEST SIGNAL) ㊾ auf „AUS" stellen.

KANALWAHL

Bei der Wahl eines UHF/VHF-Senders oder beim Umstellen auf eine andere Reihenfolge das Verfahren in der Reihenfolge wie unten beschrieben durchführen.

Beispiel: Einstellung des UHF-Senders in Stellung 2

① Den Fernseher einschalten und den Videorekorder Kanal einstellen.
② Die Betriebstaste (BETRIEB) auf Ein schalten (Das Licht leuchtet auf).
③ Die Abdeckung des Sendereinstellbereichs des Tuners öffnen.
④ Die Vorwahltaste (VORWAHL) drücken. Das Leuchtdisplay wechselt. (Abb. 1)
⑤ Die Kanalwahltaste auf der Frontplatte drücken, so daß "2" in der Stellungs-Sektion erscheint. (Abb.2)
⑥ Die Wellenbereichtaste (BAND) zur Wahl des Wellenbereichs "U" drücken. (Abb. 2)

Wellenbereichs-anzeige	Wellenbereich	Kanal
L	VL	E2 – E4, S21 – S23, S1
H	VH	E5 – E12, S2 – S20
U	U	21 – 69

⑦ Die Taste ABSTIMMUNG "+" oder "–" drücken, um einen Kanal zu empfangen und einzustellen. (Abb. 3)
⑧ Die Kanaleinstelltaste (KANALWAHL) drücken (Abb. 2)

10er-Taste	Drücken bis 4 angezeigt wird.
1er-Taste	Drücken bis 8 angezeigt wird.

Hinweis: 1. Die Kanäle Nr. 0 bis 99 können mit diesem Gerät voreingestellt werden.
Beispiel: L: S21 → 85 Kanal
2. Den Kanal mit der Kanalwahltaste wählen, wenn die Voreinstellung vorgenommen wurde.
Der eingestellte Kanal wird auf dem Fluoreszenzdisplay angezeigt.

⑨ Die Schritte 5 bis 8 wiederholen. (Bis zu 16 Stellungen.)
⑩ Die Vorwahltaste (VORWAHL) drücken. Die Zeitanzeige und die Kanalnummer erscheinen. (Abb. 4)
⑪ Die Abdeckung schließen.

Abb. 1

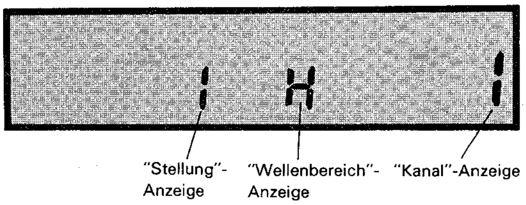


Abb. 2

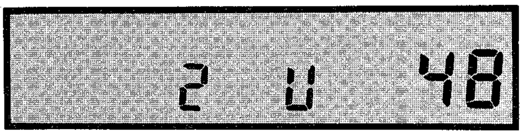
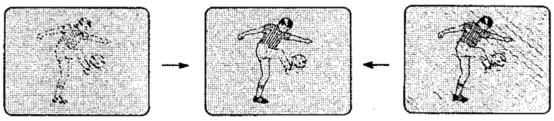


Abb. 3

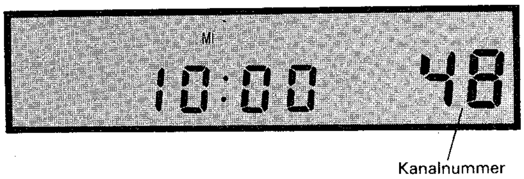


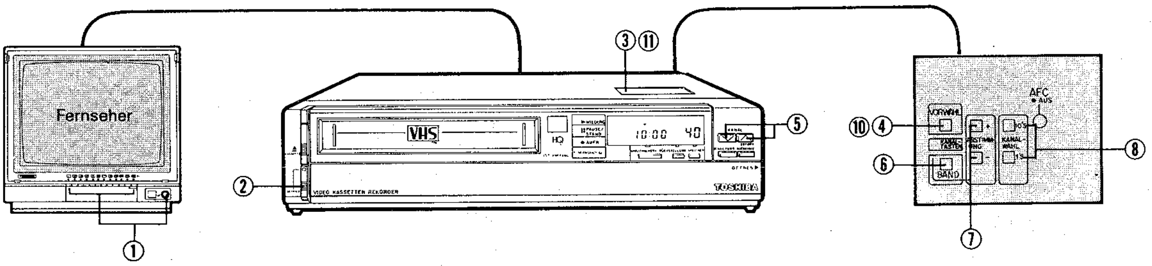
Die Taste "H" drücken, bis die Farbe erscheint.

Bestes Bild

Die Taste "L" drücken, bis die Streifen verschwinden.

Abb. 4





Einstellung der automatischen Frequenzregelung (AFC)
Wenn die Empfangsfrequenz schwach ist und der Ton Störgeräusche aufweist, die AFC des Empfangskanals ausschalten.

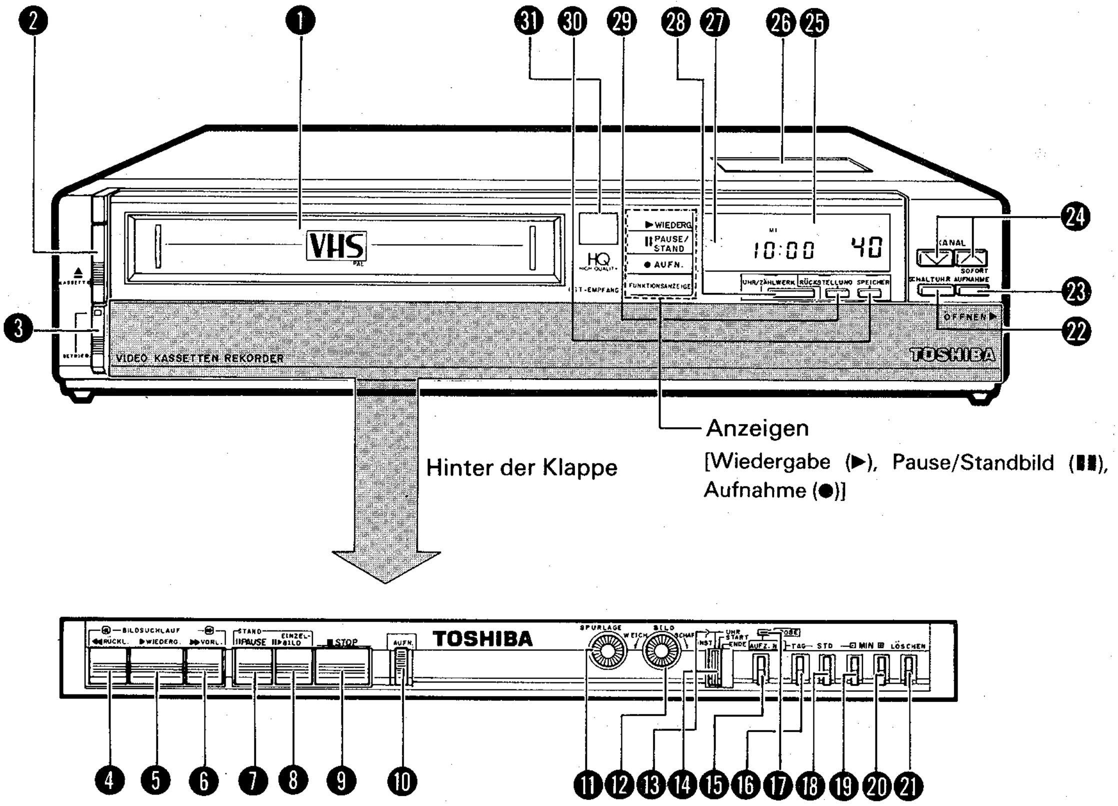
Lampe leuchtet	AFC ausgeschaltet
Lampe leuchtet nicht	AFC eingeschaltet

AFC-Ausschaltung
1. Mit der UP/DOWN-Taste den Kanal wählen, dessen AFC ausgeschaltet werden soll.
2. Die Abstimmtaste H oder L drücken.

AFC-Einschaltung
1. Die PRESET-Taste drücken. (AFC wird ausgeschaltet)
2. Dann die PRESET-Taste erneut drücken.

BEZEICHNUNGEN DER BEDIENELEMENTE

VORDERANSICHT



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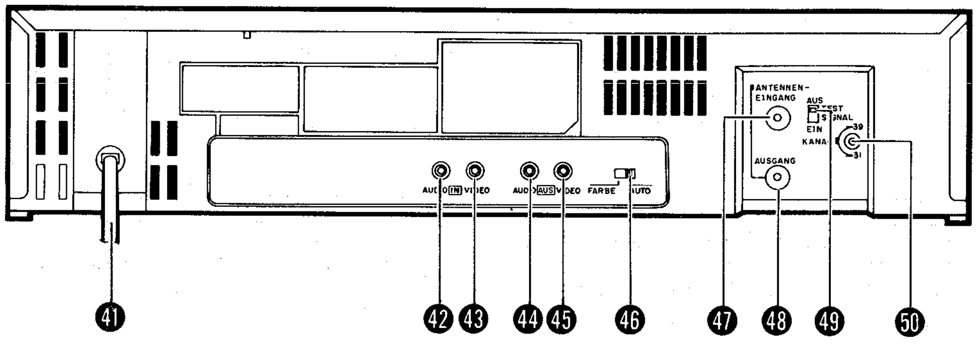
29
30
31
VHS
HQ
▶ WIEDERG.
II PAUSE/ STAND
● AUFN.
FUNKTIONSANZEIGE
10:00 40
UHR/ZÄHLWERK
RÜCKSTELLUNG
SPEICHER
KANAL
SOFORT AUFNAHME
SCHALTUHR
ÖFFNEN ▶
VIDEO KASSETTEN REKORDER
TOSHIBA
BILDSUCHLAUF
◀◀ RÜCKL.
▶ WIEDERG.
▶▶ VORL.
STAND
EINZEL-BILD
II PAUSE
■ STOP
AUFN.
TOSHIBA
SPURLAGE
BILD
WEICH
SCHARF
UHR
START
ENDE
AUFZ.
TAG
STD
MIN
LÖSCHEN

Anzeigen
[Wiedergabe (▶), Pause/Standbild (▮▮), Aufnahme (●)]

Hinter der Klappe

RÜCKANSICHT



41
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47
48
49
50
ANTENNEN-EINGANG
AUSGANG
AUS
TESTSIGNAL
EIN
KANAL
39
31
AUDIO IN VIDEO
AUDIO AUS VIDEO
FARBE
AUTO

BEZEICHNUNGEN DER BEDIENELEMENTE

VORDERANSICHT

① Kassettenfach
② Kassettenfach-Öffnungstaste (KASSETTE)
③ Betriebstaste (BETRIEB)
④ Rücklauftaste (RÜCKL.)
⑤ Wiedergabetaste (WIEDERG.)
⑥ Vorlauftaste (VORL.)
⑦ Pause/Standbild-Taste (PAUSE/STAND)
⑧ Bild-Taste (EINZELBILD)
⑨ Stoptaste (STOP)
⑩ Aufnahmetaste (AUFN.)
⑪ Spurlagenregler (SPURLAGE)
⑫ Bildregler (BILD)
⑬ Einstelltaste (EINST)
⑭ Betriebsarten-Wahlschalter (UHR/START/ENDE)
⑮ Aufzeichnungstaste (AUFZ. NR)
⑯ Tag-Taste (TAG)
⑰ Prüf-Taste (PROBE)
⑱ Stunden-Taste (STD)
⑲ Minuten-Minus-Taste (MIN (–))
⑳ Minuten-Plus-Taste (MIN (+))
㉑ Löschtaste (LÖSCHEN)
㉒ Schaltuhr-Taste (SCHALTUHR)
㉓ Eintasten-Schaltuhraufnahme-Taste (SOFORT AUFNAHME)
㉔ Kanalwahltasten (KANAL)
㉕ Leuchtdisplay
㉖ Kanalvoreinstellteil
㉗ Kassettenanzeige
㉘ Schaltuhr/Bandzählwerk-Taste (UHR/ZÄHLWERK)
㉙ Rückstelltaste (RÜCKSTELLUNG)
㉚ Speichertaste (SPEICHER)
㉛ Fernbedienung-Infrarotstrahl-Empfangsfenster

RÜCKANSICHT

㊶ Netzkabel
㊷ Audio-Eingangsbuchse (AUDIO IN)
㊸ Video-Eingangsbuchse (VIDEO IN)
㊹ Audio-Ausgangsbuchse (AUDIO AUS)
㊺ Video-Ausgangsbuchse (VIDEO AUS)
㊻ Farbschalter (FARBE/AUTO)
Dieser Schalter sollte normalerweise auf „AUTO" eingestellt sein. In Gebieten mit schwachen Signalen diesen Schalter auf FARBE stellen. Bei Wiedergabe diesen Schalter auf die gleiche Position wie bei der Aufnahme einstellen.
㊼ Antennen-Eingangsbuchse (EINGANG)
㊽ Antennen-Ausgangsbuchse (AUSGANG)
㊾ Testsignalschalter (TEST SIGNAL)
Liefert ein Testsignal zur Unterstützung bei der Abstimmung des Fernsehers auf den Ausgang des Videorekorders, siehe die Beschreibung unter „EINSTELLUNG DES FERNSEHERS AUF DEN VIDEOREKORDERAUSGANGSKANAL". (siehe Seite 2)
㊿ UHF-Kanalregler (KANAL)
Der Ausgang vom Videorekorder zum Fernseher kann auf jeden Kanal zwischen 31 und 39 mit einem Schraubenzieher eingestellt werden, siehe „EINSTELLUNG DES FERNSEHERS AUF DEN VIDEOREKORDERAUSGANGSKANAL". (siehe Seite 2)

EINSTELLUNG DER UHRZEIT

Wenn das Netzkabel zum ersten Mal in eine Netzsteckdose eingesteckt wird oder nach einer längeren Unterbrechung der Netzstromversorgung blinkt die Anzeige SO ... SA 0 : 00 auf.

Beispiel: Einstellung auf „Freitag, 19 : 25"

1. Den Betriebsarten-Wahlschalter ⑭ auf UHR stellen.

2. Die Einstelltaste (EINST) ⑬ drücken, um das Gerät auf die Uhrzeiteinstellung-Betriebsart einzustellen.

3. Mit der Tag-Taste (TAG) ⑯ den Wochentag einstellen.. „FR"

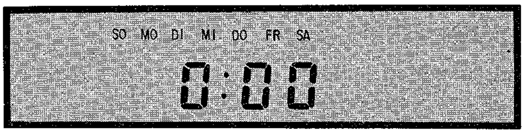
4. Mit der Stunden-Taste (STD) ⑱ die Stundenziffern einstellen ... „19"

5. Mit der MIN (+)-Taste ⑳ die Minutenziffern einstellen ... „25"

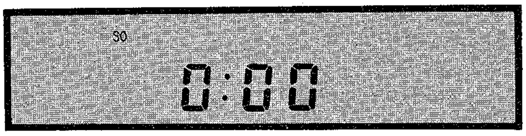
   Hinweise:
   1. Durch kurzes Drücken der Taste erhöht sich die Anzeige um Eins. Durch Gedrückthalten der Taste erhöht sich die Anzeige fortlaufend.
   2. Wenn versehentlich zu weit vorgegangen wird, mit der Taste MIN (–) ⑲ zur gewünschten Minutenziffer zurückgehen.

6. Die Einstelltaste (EINST) ⑬ drücken, um die Uhrzeit anzuzeigen. Wenn die Taste gedrückt wird, beginnt die Uhr von 0 Sekunden zu laufen.
   Die Uhrzeit kann genau eingestellt werden, indem die Einstelltaste (EINST) ⑬ beim Zeitzeichen vom Radio oder Fernsehen gedrückt wird.
   Hinweise:
   1. Vor „EINSTELLUNG DER PROGRAMMIERBAREN SCHALTUHR" muß die Uhrzeit eingestellt werden.
   2. Nach einer kurzen Stromzuführungsunterbrechung blinkt das Doppelpunktsymbol (:). Zum Rückstellen des blinkenden Doppelpunktsymbols die Einstelltaste (EINST) ⑬ zwei Mal drücken.

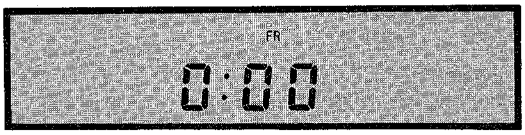
(1)



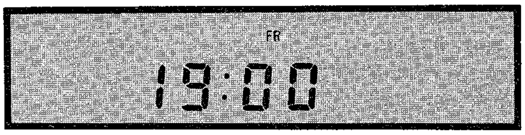
(2)



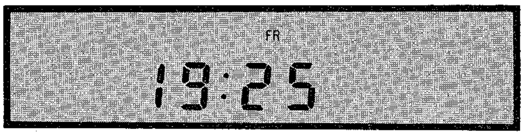
(3)



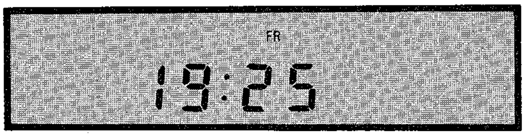
(4)



(5)



(6)



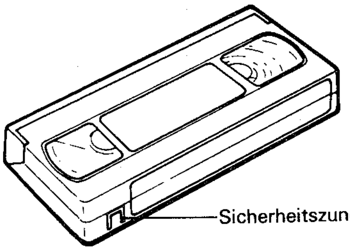
AUFNAHME

VIDEOKASSETTEN

- Dieser Rekorder arbeitet nur mit VHS-Videokassetten. E-240 für 4 Stunden, E-180 für 3 Stunden, E-120 für 2 Stunden, E-60 für 1 Stunde und E-30 für 30 Minuten Aufnahmezeit.

Kassettentyp	Aufnahme/Wiedergabezeit
E-30	30 Minuten
E-60	60 Minuten
E-120	120 Minuten
E-180	180 Minuten
E-240	240 Minuten

- Videokassetten sind mit einer Sicherheitszunge zum Schutz vor unbeabsichtigtem Löschen ausgestattet. Wenn die Zunge entfernt ist, kann die Kassette nicht bespielt werden. Zur Aufnahme auf einer Kassette, deren Zunge entfernt wurde, die Öffnung mit Klebeband verschließen.

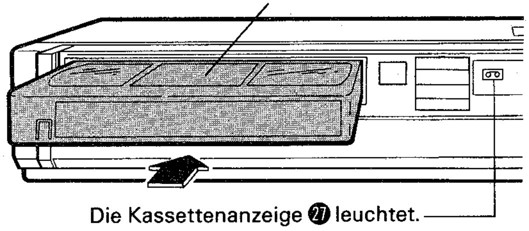


- Die Kassetten nicht direktem Sonnenlicht aussetzen und von der Heizung fernhalten.
- Extreme Feuchtigkeit, starke Vibrationen und Erschütterungen, starke magnetische Felder (in der Nähe eines Motors, Transformators oder Magneten) und staubige Plätze vermeiden.
- Die Kassetten in ihren Behältern aufbewahren und senkrecht aufstellen.

AUFNAHME VON FERNSEHPROGRAMMEN

Dieser Videorekorder ist mit einer automatischen Einschaltfunktion ausgestattet, die bewirkt, daß das Gerät durch Einschieben einer Kassette automatisch eingeschaltet wird.

1. Den Fernseher einschalten und eine Kassette in das Kassettenfach einlegen. Der Videorekorder wird automatisch eingeschaltet **(EINSCHALT-AUTOMATIK)**.


Kassettenseite mit Etikett

Die Kassettenanzeige ㉗ leuchtet.

2. Den Fernseher auf den Videorekorderkanal einstellen.
3. Den gewünschten Kanal für die Aufnahme mit Hilfe der Kanalwahltasten ㉔ wählen.
4. Die Aufnahmetaste (AUFN.) ⑩ drücken.
5. Zum Beenden der Aufnahme die Stoptaste (STOP) ⑨ drücken.
6. Zum Rückspulen des Bandes die Rücklauftaste (RÜCKL.) ④ drücken.
7. Zum Herausnehmen der Kassette die Kassettenfach-Öffnungstaste (KASSETTE) ② drücken.

Hinweise:

1. Bei Aufnahme, Wiedergabe und Schnellvorlauf wird das Band bei Erreichen des Bandendes automatisch zurückgespult. Wenn die Speichertaste (SPEICHER) ㉚ auf EIN steht, stoppt das Gerät an der Zählwerkanzeige „0000".
2. Zum Wechseln des Aufnahmekanals während der Aufnahme, die Pause/Standbild-Taste (PAUSE/STAND) ⑦ drücken, mit den Kanalwahltasten (KANAL) ㉔ den gewünschten Kanal wählen und dann die Pause/Standbild-Taste (PAUSE/STAND) ⑦ erneut zum Fortsetzen der Aufnahme drücken.
3. Die Pause/Standbild-Taste (PAUSE/STAND)⑦ drükken, um unnötiges Material auszulassen. Wenn die Pausenfunktion etwa 10 Minuten lang kontinuierlich eingesetzt wird, kehrt der Videorekorder in Stopp-Betriebsart zurück, um das Band und die internen Bauelemente zu schonen.
4. Geräte, die an den Audio und Video-Eingangsbuchsen au der Rückseite angeschlossen sind, mussen abgetrennt werden.

SEHEN EINES ANDEREN PROGRAMMS WÄHREND DER AUFNAHME

Sollten zur gleichen Zeit zwei interessante Sendungen ausgestrahlt werden, können Sie eine davon ansehen und gleichzeitig die andere aufnehmen.

1. Die Aufnahme der einen Sendung mit den obigen Bedienschritten 1 bis 4 starten.
2. Den Fernseher mit dem Kanalwähler des Fernsehers auf den Kanal stellen, der angesehen werden soll.

ÜBERSPIELEN ZWISCHEN VIDEOREKORDERN

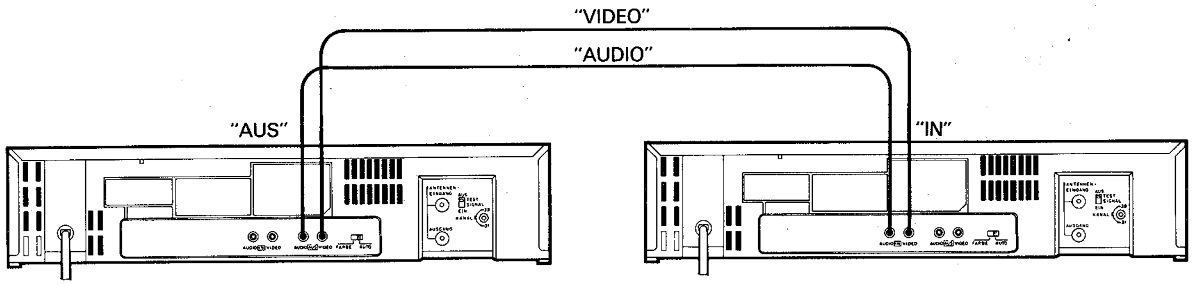
1. Die Video- und Audio-Ausgangsbuchsen (VIDEO AUS und AUDIO AUS) ㊺, ㊹ von Videorekorder 1 an die Video- und Audio-Eingangsbuchsen (VIDEO IN und AUDIO IN) ㊸, ㊷ von Videorekorder 2 anschließen.
2. Die Wiedergabe erfolgt auf Videorekorder 1 und die Aufnahme auf Videorekorder 2.
3. Auf dem Fernsehschirm kann das Wiedergabebild von Videorekorder 1 gesehen werden.

Siehe für diesen Anschluß das Diagramm unten.
Hinweis:
Wenn das Überspielen beendet ist, ziehen Sie die Kabel aus den Buchsen.

VIDEOSCHNITT

1. Die Wiedergabetaste (WIEDERG.) ⑤ drücken und den Bildschirm beobachten, bis die exakte Stelle erreicht ist, wo die neue Aufnahme beginnen soll.
2. Die Pause/Standbild-Taste (PAUSE/STAND) ⑦ drücken. Dann wird auf dem Fernsehschirm das Standbild angezeigt.
3. Die Aufnahmetaste (AUFN.) ⑩ drücken. Auf dem Fernsehschirm erscheint das Programmaterial, das aufgenommen werden soll.
4. Durch erneutes Drücken der Pause/Standbild-Taste (PAUSE/STAND) ⑦ beginnt die Aufnahme. Die neue Aufnahme wird ohne Unterbrechung direkt an die vorige angehängt.

Anschlüsse



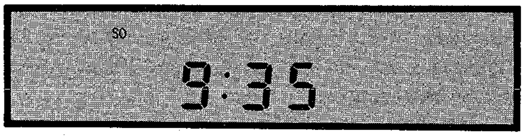
Videorekorder 1

Videorekorder 2

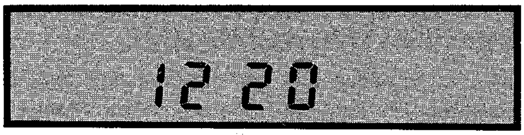
Hinweis:
Beim Überspielen nimmt die Qualität der neuen Aufnahme geringfügig ab.

Schaltuhr/Bandzählwerk-Anzeige
Mit der Schaltuhr/Bandzählwerk-Taste (UHR/ZÄHLWERK) ㉘ kann die Anzeige-Betriebsart umgestellt werden.

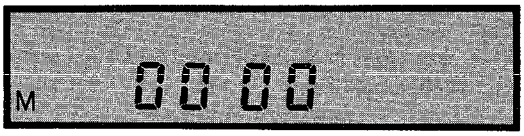
Schaltuhr-Anzeige



Bandzählwerk-Anzeige



Speicherfunktion
Wenn die Speichertaste (SPEICHER) ㉚ gedrückt wird, leuchtet die Anzeige und das Band wird beim Rückspulen und Schnellvorspulen gestoppt, wenn das Zählwerk etwa 0000 anzeigt.



Hinweis:
Wenn der Videorekorder in Bereitschafts-Betriebsart ist, wird die Speicher-Anzeige auf Schaltuhr-Anzeige umgestellt.

WIEDERGABE

WIEDERGABE VON VORBESPIELTEN KASSETTEN

1. Die Schritte 1 bis 2 unter „AUFNAHME VON FERNSEH-PROGRAMMEN" durchführen.
2. Die Wiedergabetaste (WIEDERG.) ❺ drücken.
3. Zum Beenden der Wiedergabe die Stoptaste (STOP) ❾ drücken.
4. Das Band durch Drücken der Rücklauftaste (RÜCKL.) ❹ zurückspulen.
5. Zum Herausnehmen der Kassette die Kassettenfach-Öffnungstaste (KASSETTE) ❷ drücken.

> Bei der Wiedergabe von vorbespielten Kassetten oder Kassetten, die mit einem anderen Gerät aufgenommen wurden, können auf dem Fernsehbild horizontale Störzeilen auftreten. Diese Störungen können mit dem Spurlagenregler (SPURLAGE) ⓫ reduziert werden. Nach der Einstellung des Reglers dauert es ein bis zwei Sekunden, bis die neue Einstellung wirksam wird. Nach der Wiedergabe dieser bestimmten Kassette den Regler immer wieder auf die Mittelstellung zurückdrehen.

> Dieses Gerät ist mit einem Bildregler (BILD) ⓬ ausgestattet. Durch Drehen des Reglers in Uhrzeigerrichtung wird das Bild schärfer und durch Drehen in Gegenuhrzeigerrichtung weicher.

BILDSUCHLAUF

1. Die Wiedergabetaste (WIEDERG.) ❺ drücken (zum Starten der Wiedergabe).
2. Durch Drücken der Rücklauf- oder Vorlauftaste (RÜCKL. oder VORL.) ❹, ❻ läuft das Bild schneller (mit etwa der 7-fachen Normalgeschwindigkeit) in Rückwärts- bzw. Vorwärtsrichtung. Auf diese Weise können gesuchte Bandstellen schnell gefunden werden.

Hinweise:

* Während des Bildsuchlaufs bewegen sich einige Störzeilen aufwärts und abwärts auf dem Bildschirm.
* Wenn während des Bildsuchlaufs das Bild vertikal auf dem Fernsehschirm wandert, den V-Bildfangregler des Fernsehers einstellen.
* Während des Bildsuchlaufs ist der Ton unterdrückt.

STANDBILD

1. Die Wiedergabetaste (WIEDERG.) ❺ drücken (zum Starten der Wiedergabe).
2. Zum Anhalten des Bildes und Ansehen des Standbildes die Pause/Standbild-Taste (PAUSE/STAND) ❼ drükken.
3. Durch erneutes Drücken der Pause/Standbild-Taste (PAUSE/STAND) ❼ wird die normale Wiedergabe fortgesetzt.

Hinweise:

1. Nach etwa 5 Minuten wird die Standbild-Betriebsart automatisch ausgeschaltet und die Wiedergabe fortgesetzt.
2. Wenn in der Mitte des Standbildes Störungen erscheinen, kann versucht werden, durch Drücken der Bild-Taste (EINZELBILD) ❽ die Störungen aus dem Bild bringen.

BILD-FORTSCHALTUNG

Zeitlupen-Wiedergabe mit 1/10 der Normalgeschwindigkeit kann durchgeführt werden, indem die Bild-Taste (EINZELBILD) ❽ gedrückt gehalten wird.

1. Die Wiedergabetaste (WIEDERG.) ❺ drücken (in Wiedergabe-Betriebsart).
2. Die Pause/Standbild-Taste (PAUSE/STAND) ❼ drükken (in Standbild-Betriebsart).
3. Die Bild-Taste (EINZELBILD) ❽ gedrückt halten. Wiedergabe mit 1/10 der Normalgeschwindigkeit wird durchgeführt.
4. Die Bild-Taste (EINZELBILD) ❽ loslassen und dann die Pause/Standbild-Taste (PAUSE/STAND) ❼ drücken. Der Videorekorder kehrt in Normal-Betriebsart zurück.

AUTOMATISCHE WIEDERGABE

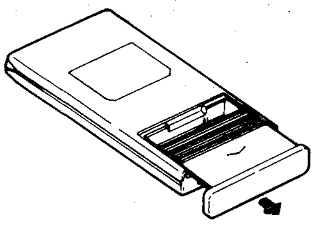
Die Rücklauftaste (RÜCKL.) ❹ gedrückt halten und die Wiedergabetaste (WIEDERG.) ❺ drücken. Wenn die Speichertaste (SPEICHER) ㉚ auf EIN steht, wird das Band bis zur Zählwerkanzeige "0000" zurückgespult, dann startet die Wiedergabe. Wenn die Speichertaste (SPEICHER) ㉚ auf AUS steht, wird das Band zum Bandanfang zurückgespult, dann startet die Wiedergabe.

Hinweise:

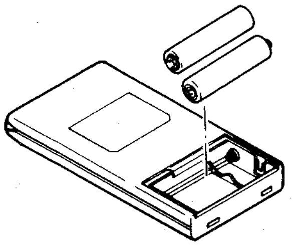
1. Beim Zurückspulen blinkt die WIEDERG.-Anzeigelampe.
2. Nach dem Zurückspulen wird die Kassette einmal wiedergegeben.

FERNBEDIENUNG

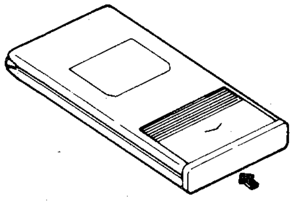
EINSETZEN DER BATTERIEN



Den Batteriefachdeckel in Pfeilrichtung abschieben.



2 Batterien (Größe „R03") einsetzen.
Hinweis: Die Batterien entsprechend der Polaritätsmarkierungen einsetzen.



Den Batteriefachdeckel schließen.

WIRKUNGSBEREICH DER FERNBEDIENUNG

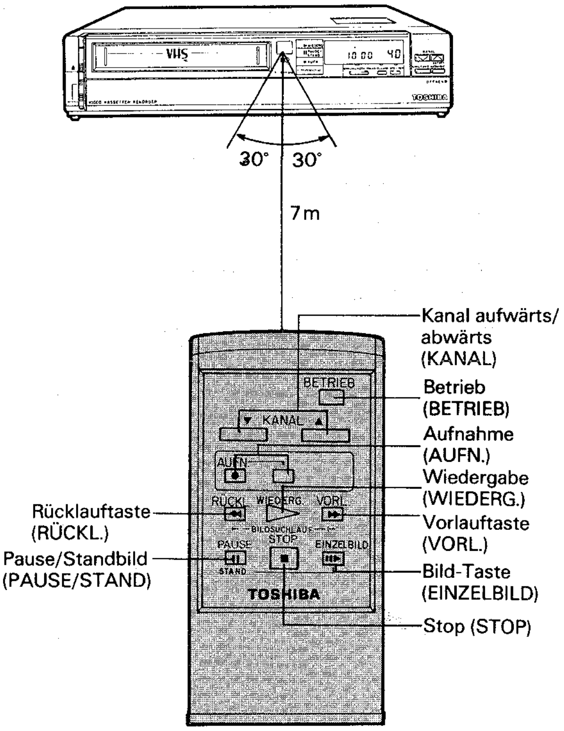
Die Fernbedienung muß „Sichtkontakt" mit dem Infrarotstrahl-Empfangsfenster (31) vorne am Videorekorder haben. Sie muß sich in einem Winkel von 30° nach beiden Seiten von der Mittellinie befinden. Auf die Frontseite des VTR gerichtet, beträgt die maximale Funktionsdistanz der Fernbedienungseinheit etwa 7 m.

TASTENFUNKTIONEN DER FERNBEDIENUNG

Die Funktionen der Tasten der Fernbedienung entsprechen den Tasten an der Frontplatte des Videorekorders. Mit den Tasten der Fernbedienung lassen sich 13 Funktionen bedienen, nämlich Kanal aufwärts/abwärts (KANAL), Betriebstaste (BETRIEB), Aufnahme (AUFN.), Rücklauftaste (RÜCKL.), Vorlauftaste (VORL.), Bildsuchlauf vorwärts/rückwärts, Wiedergabe (WIEDERG.), Pause/Standbild (PAUSE/STAND), Stop (STOP) und Bild (EINZELBILD).

Hinweise:

1. In den folgenden Fällen ist Fernbedienung nicht möglich:
   - In der Betriebsart Schaltuhr-Aufnahme.
   - Wenn sich keine Kassette im Kassettenfach befindet.
2. Die Tasten der Fernbedienung in Zeitabständen von etwa einer Sekunde drücken, damit ein ordnungsgemäßes Funktionieren gewährleistet ist.
3. Wenn die Fernbedienung für längere Zeit nicht verwendet werden soll, sollten die Batterien entnommen werden, um Beschädigungen durch Auslaufen der Batterien zu verhindern.
4. Die Fernbedienung nicht Wärme, Feuchtigkeit und Erschütterungen aussetzen.
5. Die automatische Wiedergabe kann nicht mit der Fernbedienung durchgeführt werden. Für automatische Wiedergabe müssen die Bedienelemente am Gerät betätigt werden.
6. Drücken Sie die Aufnahmetaste (AUFN.) gleichzeitig mit der rechten Taste.


VHS
TOSHIBA
30°
30°
7m
Kanal aufwärts/ abwärts (KANAL)
Betrieb (BETRIEB)
Aufnahme (AUFN.)
Wiedergabe (WIEDERG.)
Vorlauftaste (VORL.)
Bild-Taste (EINZELBILD)
Stop (STOP)
Rücklauftaste (RÜCKL.)
Pause/Standbild (PAUSE/STAND)
BETRIEB
KANAL
AUFN
RÜCKL
WIEDERG.
VORL
BILDSUCHLAUF
PAUSE
STOP
EINZELBILD
STAND
TOSHIBA

SCHALTUHR

BEDIENELEMENTE FÜR SCHALTUHRBETRIEB

⑬ Einstelltaste (EINST)
- Dient zur Einstellung der Uhrzeit.
- Durch einmaliges Drücken dieser Taste schaltet das Gerät in die Uhrzeiteinstellung-Betriebsart. Diese Betriebsart wird durch nochmaliges Drücken der Taste wieder aufgehoben.

⑭ Betriebsarten-Wahlschalter
- UHR-Betriebsart
  Zur Anzeige der Uhrzeit.
- START-Betriebsart
  Zur Einstellung der Schaltuhr-Einschaltzeit.
- ENDE-Betriebsart
  Zur Einstellung der Schaltuhr-Ausschaltzeit.

⑮ Aufzeichnungstaste (AUFZ.NR)
- Dient zur Eingabe der Programmnummer 1 bis 4.

⑯ Tag-Taste (TAG)
- Dient zur Eingabe des Wochentages.
- Durch einmaliges Drücken dieser Taste geht die Anzeige um einen Tag weiter. Wird diese Taste gedrückt gehalten, geht die Anzeige fortlaufend weiter.
  (Beispiel)

→ Ein Tag der ersten Woche, „SO" → „MO" → ... „SA"
↓
Ein Tag der nächsten Woche, „FOLG SO" → „FOLG MO" → ... „FOLG SA"
↓
Der gleiche Tag jeder Woche, „WCHTL SO" → „WCHTL MO" → ... → „WCHTL SA"
↓
Täglich, „SO. MO. DI ... SA"

⑰ Prüf-Taste (PROBE)
Dient zum Prüfen der gespeicherten Programmdaten. Wenn diese Taste gedrückt wird, beginnt der Programmsuchlauf und zeigt die Programminhalte 1 bis 4 (Start- und Endzeitpunkt) kontinuierlich im Leuchtdisplay. Nach Anzeige der Programminhalte arbeitet das Display wieder als Uhr.

⑱ Stunden-Taste (STD)
- Dient zur Eingabe der Stundenziffern.
- Durch einmaliges Drücken der Taste erhöht sich die Stundenanzeige um Eins.
  Wird die Taste gedrückt gehalten, erhöht sich die Stundenanzeige fortlaufend.

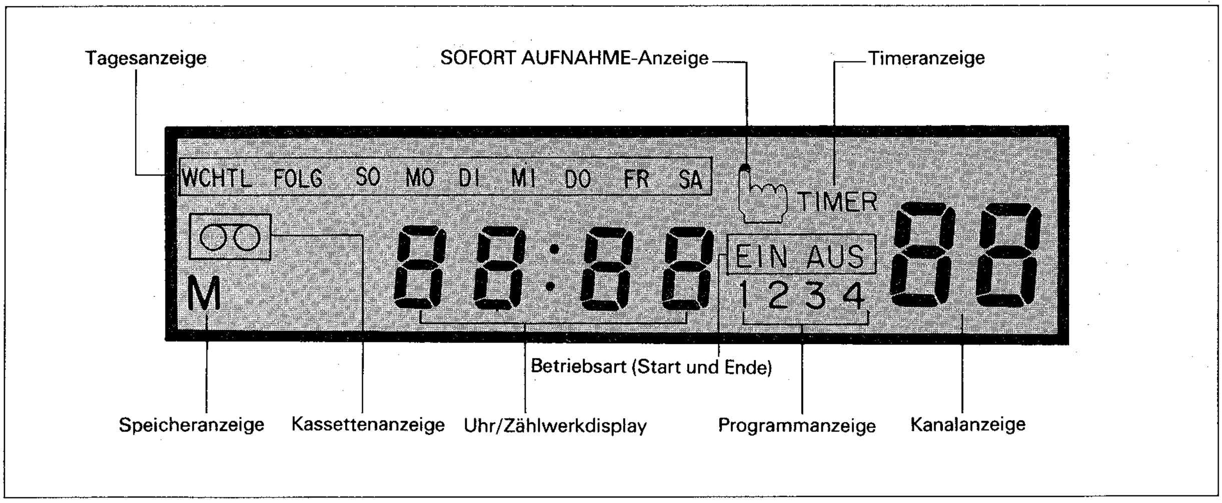
⑲ Minuten-Minus-Taste (MIN (–))
- Dient zur Einstellung der Minutenziffern.
- Wenn diese Taste einmal gedrückt wird, wird die Minute um 1 vermindert. Durch Gedrückthalten der Taste erfolgt eine schnelle Veränderung.

⑳ Minuten-Plus-Taste (MIN (+))
- Dient zur Einstellung der Minutenziffern.
- Wenn diese Taste einmal gedrückt wird, wird die Minute um 1 erhöht. Durch Gedrückthalten der Taste erfolgt eine schnelle Veränderung.

㉑ Löschtaste (LÖSCHEN)
Dient zum Löschen der eingespeicherten Programme.

㉒ Schaltuhr-Taste (SCHALTUHR)
Dient zur Einstellung der Schaltuhr-Betriebsart.

㉓ Eintasten-Schaltuhraufnahme-Taste
(SOFORT AUFNAHME)
- Dient für Aufnahmen von 30 Minuten oder Mehrfache davon in der normalen Betriebsart (max. 4 Stunden).
  * Uhrzeit → 30 Min. → 60 Min. → ..... → 240
- Dient zur Angabe der Timer-Aus-Zeit in Einheiten von 30 Minuten.
  30 → 60 → 90 → .....



PROGRAMMIERBARE SCHALTUHR

- Dieser Timer kann vier Programme für einen Tag der ersten Woche, für einen Tag der nächsten Woche, für den gleichen Tag jeder Woche oder für die gleiche Zeit an jedem Tag aufnehmen.
- Wenn die Spannungsversorgung zum Videorekorder kurz unterbrochen wird, läuft die Uhr weiter und werden die programmierten Aufnahmen ausgeführt, außer wenn auf der Uhranzeige SO ..... SA 0 : 00 blinkt.
- Wenn auf der Uhranzeige SO ..... SA 0 : 00 blinkt, müssen Uhreinstellung und Programmierung erneut durchgeführt werden. (Nach einer kurzen Stromunterbrechung von etwa einigen Sekunden, leucht die Uhranzeige blinkend auf.) Der Doppelpunkt (:) blinkt bei kurzen Unterbrechungen der Spannungsversorgung. Durch zweimaliges Drücken der Einstelltaste (EINST) ⑬ wird die blinkende Doppelpunkt-Anzeige zurückgesetzt. Die gespeicherten Programme werden reserviert.
- Die Uhr arbeitet im 24-Stunden-Betrieb.
- Die Einstellung der Schaltuhr ist auch in der Bereitschaftsbetriebsart möglich.

Einstellung der programmierbaren Schaltuhr

1. Die Uhrzeit überprüfen und gegebenenfalls korrigieren. (siehe Seite 6)
2. Eine Kassette in das Kassettenfach einlegen (überprüfen, daß die Sicherheitszunge der Kassette vorhanden ist).
3. Den Betriebsarten-Wahlschalter ⑭ auf START stellen.
4. Die Programmnummer mit der Aufzeichnungstaste (AUFZ.NR) ⑮ angeben. (Eine aus der Programmnummern 1 bis 4 angeben.)
5. Den Wochentag, die Stunde und die Minute der Aufnahmezeit (SO → MO ... → SA, FOLG SO → FOLG MO → ... → FOLG SA, WCHTL SO → WCHTL MO → ... → WCHTL SA, SO.MO. ... SA) mit der Tag-Taste (TAG) ⑯, der Stunden-Taste (STD) ⑱, der MIN (+)-Taste ⑳ und der MIN (–)-Taste ⑲ einstellen.
6. Den Betriebsarten-Wahlschalter ⑭ auf ENDE stellen.
7. Den Endzeitpunkt mit der Stunden-Taste (STD) ⑱, der MIN (+)-Taste ⑳ und der MIN (–)-Taste ⑲ einstellen.
8. Das gewünschte Programm mit den Kanalwahltasten (KANAL) ㉔ einstellen.
9. Zum Fortsetzen der Vorwahl der Programme die Schritte 3 bis 8 wiederholen (maximal 4 Programme).
10. Den Betriebsarten-Wahlschalter ⑭ auf UHR zurückstellen.
11. Die Schaltuhr-Taste (SCHALTUHR) ㉒ drücken.

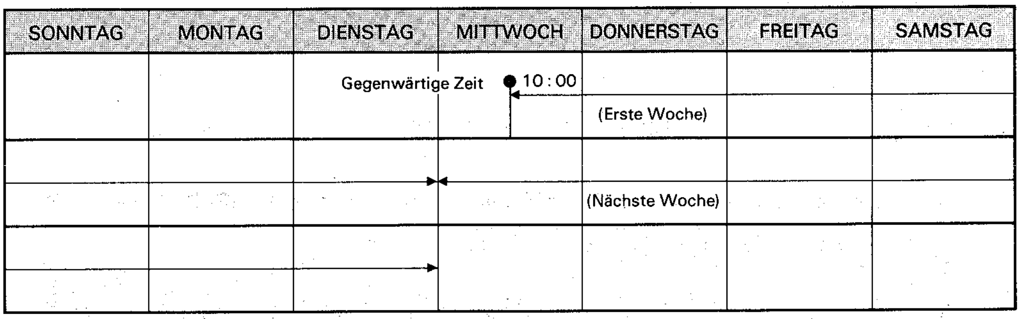
ZUM BESSEREN VERSTÄNDNIS DES 14-TAGE-TIMERS

Mit diesem Videorekorder ist 14-Tage-Voreinstellung möglich. Diese Funktion ist nützlich, aber wenn sie nicht richtig eingesetzt wird, ist wunschgemäße Aufnahme nicht möglich.

Vor dem Einsatz der 14-Tage-Timerfunktion die folgende Erklärung gründlich durchlesen. Die untenstehende Abbildung (1) zeigt, wie bei einer momentanen Uhrzeit von 10:00 die folgenden 14 Tage in die erste Woche und die folgende Woche unterteilt sind.

Denken Sie beim Erlernen der 14-Tage-Timerfunktion an dieses Schema.

Abb. (1)



Die Standardzeit für den 14-Tage-Timer ist der Zeitpunkt, wo die Schaltuhr-Taste gedrückt wird. Was passiert, wenn der Timer am Mittwoch der jetzigen Woche (Abb. (2)) zur Aufzeichnung des Fernsehprogramms am Donnerstag der nächsten Woche eingestellt wird und die Schaltuhr-Taste am Freitag der momentanen Woche (Abb. (3)) gedrückt wird? Es ist nicht möglich, das gewünschte Programm aufzuzeichnen. Siehe untenstehende Abbildung.

Abb. (2)

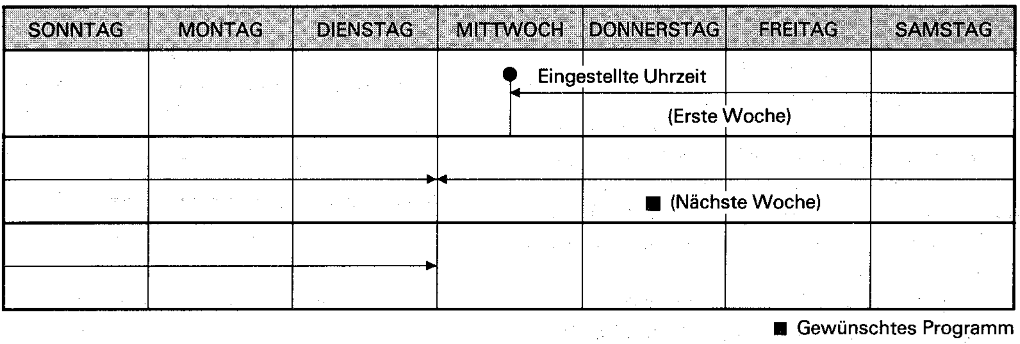
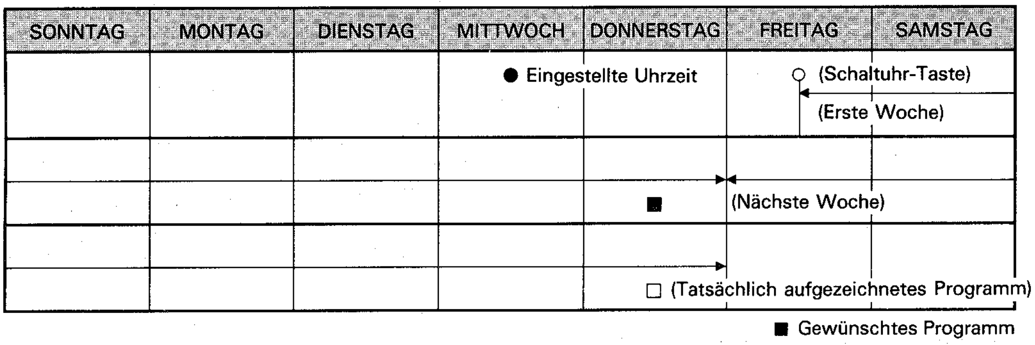
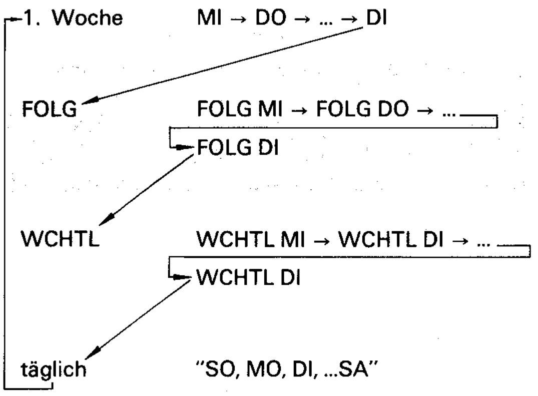

SONNTAG
MONTAG
DIENSTAG
MITTWOCH
DONNERSTAG
FREITAG
SAMSTAG
● Eingestellte Uhrzeit
(Erste Woche)
■ (Nächste Woche)
■ Gewünschtes Programm

Abb. (3)


SONNTAG
MONTAG
DIENSTAG
MITTWOCH
DONNERSTAG
FREITAG
SAMSTAG
● Eingestellte Uhrzeit
○ (Schaltuhr-Taste)
(Erste Woche)
■ (Nächste Woche)
□ (Tatsächlich aufgezeichnetes Programm)
■ Gewünschtes Programm

DAS TAGESDISPLAY

Wenn die Tag-Taste (TAG) ⑯ gedrückt wird, wird das Tagesdisplay wiederholt, wie unten gezeigt.
Beispiel: Heute ist Mittwoch.

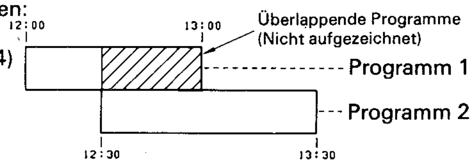

1. Woche
MI → DO → ... → DI
FOLG
FOLG MI → FOLG DO → ...
FOLG DI
WCHTL
WCHTL MI → WCHTL DI → ...
WCHTL DI
täglich
"SO, MO, DI, ...SA"

Hinweis:
Das Tagesdisplay ändert sich vom heutigen Tag an.

VORSICHTSMASSREGELN ZUM EINSATZ DES 14-TAGE-TIMERS

- Sicherstellen, daß die Uhrzeit richtig eingestellt ist.
- Wenn der Videorekorder von Timer-Betriebsart auf Normal-Betriebsart umgestellt werden soll, die Betriebstaste (BETRIEB) ❸ oder Schaltuhr-Taste (SCHALTUHR) ㉒ drücken.
- Wenn der Videorekorder auf Timer-Betriebsart zurückgestellt wird, immer die Prüf-Taste (PROBE) ⑰ drücken, um sicherzustellen, daß das richtige Programm eingestellt ist. Andernfalls kann es sein, daß das Programm nicht aufgezeichnet werden kann, weil die Standardzeit für den 14-Tage-Timer sich auf den Zeitpunkt beim Drücken der Schaltuhr-Taste (SCHALTUHR) bezieht.
- Wenn voreingestellte Programme nicht durchgeführt werden, bleiben sie reserviert.
- Darauf achten, nicht die voreingestellten Zeitpunkte überlappen zu lassen. Wenn voreingestellte Programme überlappt werden, hat der Start-Zeitpunkt Priorität zur Ausführung, und die überlappenden Programme werden nicht aufgezeichnet. Siehe Abb. (4) unten:

Abb. (4)


12:00
13:00
Überlappende Programme
(Nicht aufgezeichnet)
Programm 1
Programm 2
12:30
13:30

Timer-Aufzeichnung

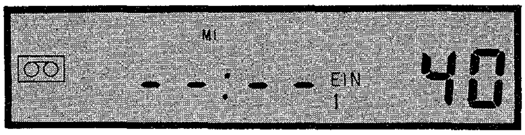
Im folgenden einige Beispiel zum leichteren Verständnis des Timers. Das Beispiel geht davon aus, daß der Timer mit vier Programmen (ein Tag der gleichen Woche, ein Tag der nächsten Woche, der gleiche Tag jeder Woche und täglich) eingestellt wird.

Beispiel: Heute ist Mittwoch, 9:00 Uhr.
Die Programme werden wie folgt eingestellt:
Programm 1. 1. Freitag 11:00 bis 11:30, Kanal 43 .... unwirksam nach Durchführung
Programm 2. Nächster Dienstag 13:00 bis 13:15, Kanal 42..... unwirksam nach Durchführung
Programm 3. Wöchentlich Montag 8:00 bis 8:15, Kanal 46........ kontinuierlich wirksam nach Durchführung
Programm 4. Täglich 19:00 bis 19:15, Kanal 43 .. kontinuierlich wirksam nach Durchführung

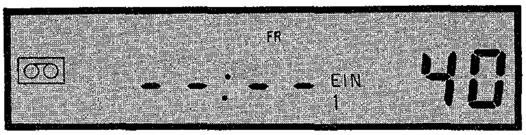
Verfahren 1)

1. Den Betriebsarten-Wahlschalter ⑭ auf „START" stellen.
2. Die Tag-Taste (TAG) ⑯ drücken, um „FR" einzustellen.
3. Die Stunden-Taste (STD) ⑱, MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Startzeit einstellen .... „11 : 00"
4. Den Betriebsarten-Wahlschalter ⑭ auf „ENDE" stellen.
5. Die MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Endzeit einstellen .... „11 : 30"
6. Die Kanalwahltaste (KANAL) ㉔ drücken, um den gewünschten Kanal einzustellen .... „43"

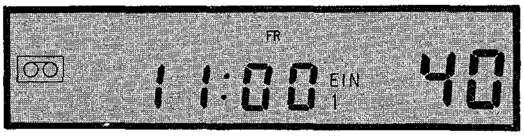
1)-1



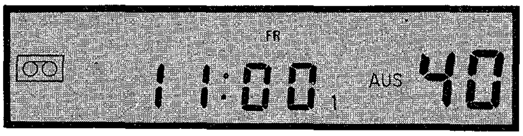
1)-2



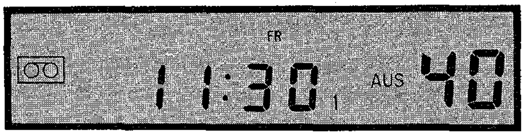
1)-3



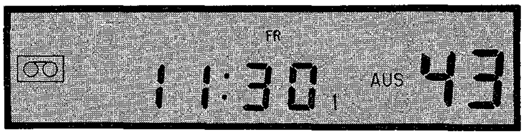
1)-4



1)-5



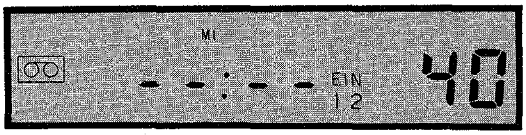
1)-6



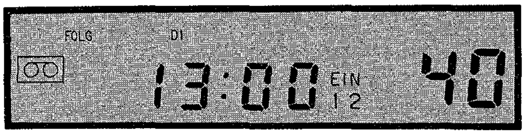
Verfahren 2)

1. Den Betriebsarten-Wahlschalter ⑭ auf „START" stellen.
2. Die Aufzeichnungstaste (AUFZ.NR) ⑮ drücken, um „2" einzustellen.
3. Die Tag-Taste (TAG) ⑯ auf „FOLG DI" stellen.
4. Die Stunden-Taste (STD) ⑱, MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Startzeit einstellen .... „13 : 00"
5. Den Betriebsarten-Wahlschalter ⑭ auf „ENDE" stellen.
6. Die MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Endzeit einstellen .... „13 : 15"
7. Die Kanalwahltaste (KANAL) ㉔ drücken, um den gewünschten Kanal einzustellen .... „42"

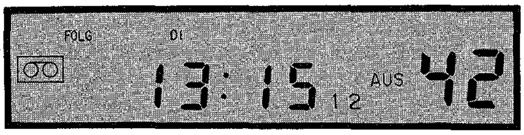
2)-2



2)-4


FOLG
DI
13:00
EIN
1 2
40

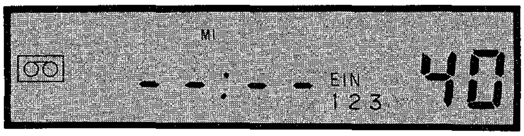
2)-7


FOLG
DI
13:15
1 2
AUS
42

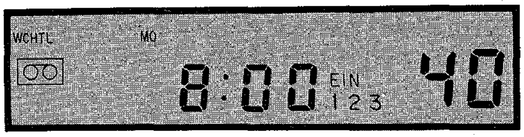
Verfahren 3)

1. Den Betriebsarten-Wahlschalter ⑭ auf „START" stellen.
2. Die Aufzeichnungstaste (AUFZ.NR) ⑮ drücken, um „3" einzustellen.
3. Die Tag-Taste (TAG) ⑯ auf „WCHTL MO" stellen.
4. Die Stunden-Taste (STD) ⑱, MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Startzeit einstellen .... „8 : 00"
5. Den Betriebsarten-Wahlschalter ⑭ auf „ENDE" stellen.
6. Die MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Endzeit einstellen .... „8 : 15"
7. Die Kanalwahltaste (KANAL) ㉔ drücken, um den gewünschten Kanal einzustellen .... „46"

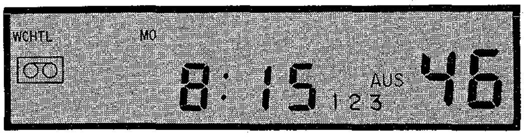
3)-2


MI
--:--
EIN
1 2 3
40

3)-4


WCHTL
MO
8:00
EIN
1 2 3
40

3)-7


WCHTL
MO
8:15
1 2 3
AUS
46

Verfahren 4)

1. Den Betriebsarten-Wahlschalter ⑭ auf „START" stellen.
2. Die Aufzeichnungstaste (AUFZ.NR) ⑮ drücken, um „4" einzustellen.
3. Die Tag-Taste (TAG) ⑯, auf „SO, MO, ... SA" stellen.
4. Die Stunden-Taste (STD) ⑱, MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Startzeit einstellen .... „19 : 00"
5. Den Betriebsarten-Wahlschalter ⑭ auf „ENDE" stellen.
6. Die MIN (–)-Taste ⑲ und die MIN (+)-Taste ⑳ auf Endzeit einstellen .... „19 : 15"
7. Die Kanalwahltaste ㉔ drücken, um den gewünschten Kanal einzustellen .... „43"
8. Den Betriebsarten-Wahlschalter ⑭ auf „UHR" stellen.
9. Die Schaltuhr-Taste (SCHALTUHR) ㉒ drücken.

Hinweise:

1. Wenn ein Programm vorgewählt werden soll, den Betriebsarten-Wahlschalter nach Durchführung von Schritt 6 bei Verfahren 1) auf Stellung „UHR" stellen und dann die Schaltuhr-Taste drücken.
2. Wenn keine Kassetten eingelegt ist, ist Timer-Aufzeichnung nicht möglich. In diesem Fall erscheint die Anzeige „E", wenn die Schaltuhr-Taste (SCHALTUHR) ㉒ gedrückt wird. Wenn die Löschschutzzunge der Kassette abgebrochen ist, ist Timer-Aufzeichnung ebenfalls unmöglich. In diesem Fall wird die Kassette automatisch ausgeworfen. (Abb. 1)
3. Bei Timer-Aufzeichnung können die Vorwahl-Inhalte (Programmnummer, Kanal, Wochentag oder Timer-Ein/Aus-Zeit) nicht geändert werden.
4. Der End-Zeitpunkt kann alle 30 Minuten mit der Eintasten-Schaltuhraufnahme-Taste (SOFORT AUFNAHME) voreingestellt werden.

Prüfen der Timer-Einstellung

Die Prüf-Taste (PROBE) ⑰ drücken.
Dann erscheinen die Programminhalte 1 bis 4 (Startzeit und Endzeit), die vorher gespeichert sind, kontinuierlich in der Schaltuhr/Bandzählwerk-Anzeige. Wenn der Programm-Suchlauf das Ende erreicht, kehrt das Display zur Anzeige der momentanen Uhrzeit zurück.

Löschen der Timer-Einstellung

1. Den Betriebsarten-Wahlschalter ⑭ auf START stellen.
2. Die Prüf-Taste (PROBE) ⑮ drücken, um die zu löschende Programmnummer anzuzeigen.
3. Die Löschtaste (LÖSCHEN) ㉑ drücken. Timer-Aus-Zeit und Kanal werden ebenfalls gelöscht.

Hinweis:
Die Timer-Einstellung kann nur gelöscht werden, wenn der Betriebsarten-Wahlschalter ⑭ auf START steht.

Verwendung des Videorekorders nach Drücken der schaltuhr-Taste (SCHALTUHR).

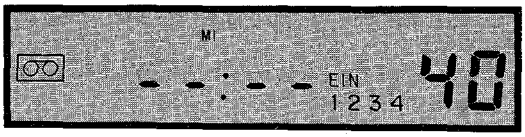
1. Die Betriebstaste (BETRIEB) ③ drücken, um einzuschalten.

Rückstellen des Videorekorders auf Timer-Betriebsart

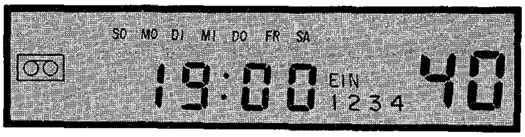
1. Die Prüf-Taste (PROBE) ⑰ drücken, um Programme zu überprüfen.
2. Die Schaltuhr-Taste (SCHALTUHR) ㉒ drücken.

Hinweis:
Die Standardzeit für den Timerbetrieb ist der Zeitpunkt des Drückens der Schaltuhr-Taste (SCHALTUHR).

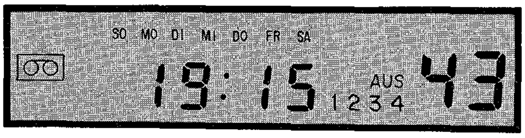
4)-2



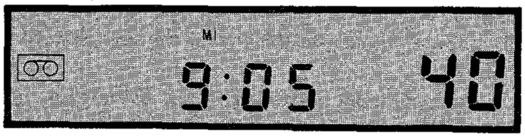
4)-4



4)-7



4)-8



Hinweis: Während der Einstellung geht die Uhrzeit vor.

4)-9

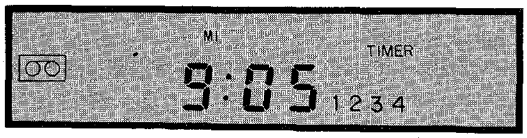
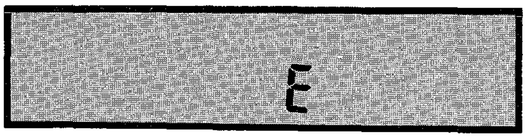


Abb. 1



SCHALTUHRAUFNAHME MIT EINEM TASTENDRUCK

Hinweise:

1. Jedesmal, wenn die Eintasten-Schaltuhraufnahme-Taste (SOFORT AUFNAHME) ㉓ gedrückt wird, wird die Aufnahmezeit um 30 Minuten verlängert. Die längste Aufnahmezeit beträgt 4 Stunden (achtmaliges Drücken der Taste). (Die Einstellung der Eintasten-Schaltuhraufnahme kann nur in Schritten von 30 Minuten durchgeführt werden.)
2. Die Eintasten-Schaltuhraufnahme ist nur möglich, wenn das Gerät mit Spannung versorgt wird und der Schaltuhr-Wahlschalter ⑭ auf UHR steht.

Beispiel: Aufnahme von Kanal 42 für 1-1/2 Stunden, beginnend zur gegenwärtigen Zeit 22 : 05 am Donnerstag

1. Kanal 42 durch Drücken der Kanalwahltaste (KANAL) ㉔ wählen. (Abb. 1)
2. Zur Einstellung der Aufnahmedauer die Eintasten-Schaltuhraufnahme-Taste (SOFORT AUFNAHME) ㉓ drücken.
   Erstes Drücken: 22 : 35 (30 Minuten)
   Zweites Drücken: 23 : 05 (1 Stunde)
   Drittes Drücken: 23 : 35 (1 Stunde und 30 Minuten) (Abb. 2)
3. Danach innerhalb von 9 Sekunden die Schaltuhr-Taste (SCHALTUHR) ㉒ drücken. (Abb. 3)

Abb. 1

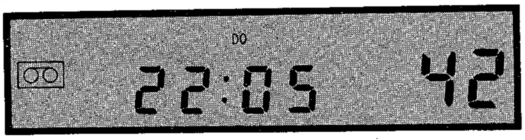


Abb. 2

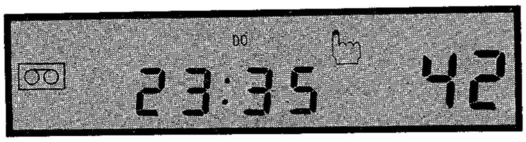
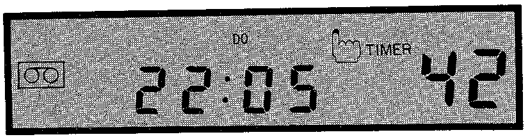


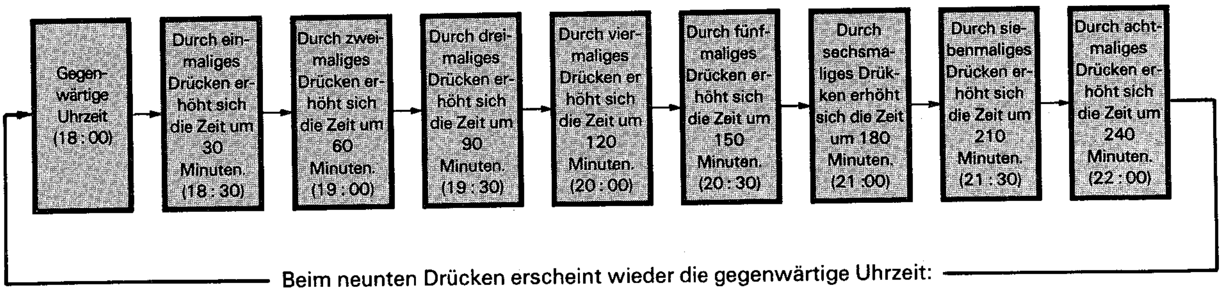
Abb. 3


DO
TIMER
22:05
42

Beispiel: Einstellung von Kanal 40 für Aufnahme am Samstag um 20 : 02 für 1 Stunde für Programm 1, Zeitpunkt der Einstellung: Dienstag 8 : 21

1. Für Einstellung von Programmnummer, Kanal und Schaltuhr-Einschaltzeit siehe die Schritte 1 bis 6 unter „Timer-Aufzeichnung".
2. Den Betriebsarten-Wahlschalter ⑭ auf ENDE stellen.
3. Die Eintasten-Schaltuhraufnahme-Taste (SOFORT AUFNAHME) ㉓ zweimal drücken.
4. Den Betriebsarten-Wahlschalter ⑭ auf UHR stellen.
5. Zur Beendigung der Einstellung die Schaltuhr-Taste (SCHALTUHR) ㉒ drücken.
   Die TIMER-Anzeige leuchtet.

Fehleranzeige: Wenn die Schaltuhr-Taste (SCHALTUHR) ㉒ gedrückt wird, ohne daß die Schaltuhr-Einschaltzeit und/oder -Ausschaltzeit eingestellt ist oder ohne daß eine Kassette eingelegt ist, leuchtet die Anzeige „E" (während die Schaltuhr-Taste (SCHALTUHR) ㉒ gedrückt wird).


Gegenwärtige Uhrzeit (18 : 00)
Durch einmaliges Drücken erhöht sich die Zeit um 30 Minuten. (18 : 30)
Durch zweimaliges Drücken erhöht sich die Zeit um 60 Minuten. (19 : 00)
Durch dreimaliges Drücken erhöht sich die Zeit um 90 Minuten. (19 : 30)
Durch viermaliges Drücken er höht sich die Zeit um 120 Minuten. (20 : 00)
Durch fünfmaliges Drücken erhöht sich die Zeit um 150 Minuten. (20 : 30)
Durch sechsmaliges Drükken erhöht sich die Zeit um 180 Minuten. (21 :00)
Durch siebenmaliges Drücken erhöht sich die Zeit um 210 Minuten. (21 : 30)
Durch achtmaliges Drücken erhöht sich die Zeit um 240 Minuten. (22 : 00)
Beim neunten Drücken erscheint wieder die gegenwärtige Uhrzeit:

SECTION 2

ADJUSTMENT PROCEDURES

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1. MECHANICAL ADJUSTMENT 1

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2-4. Video Circuit 33

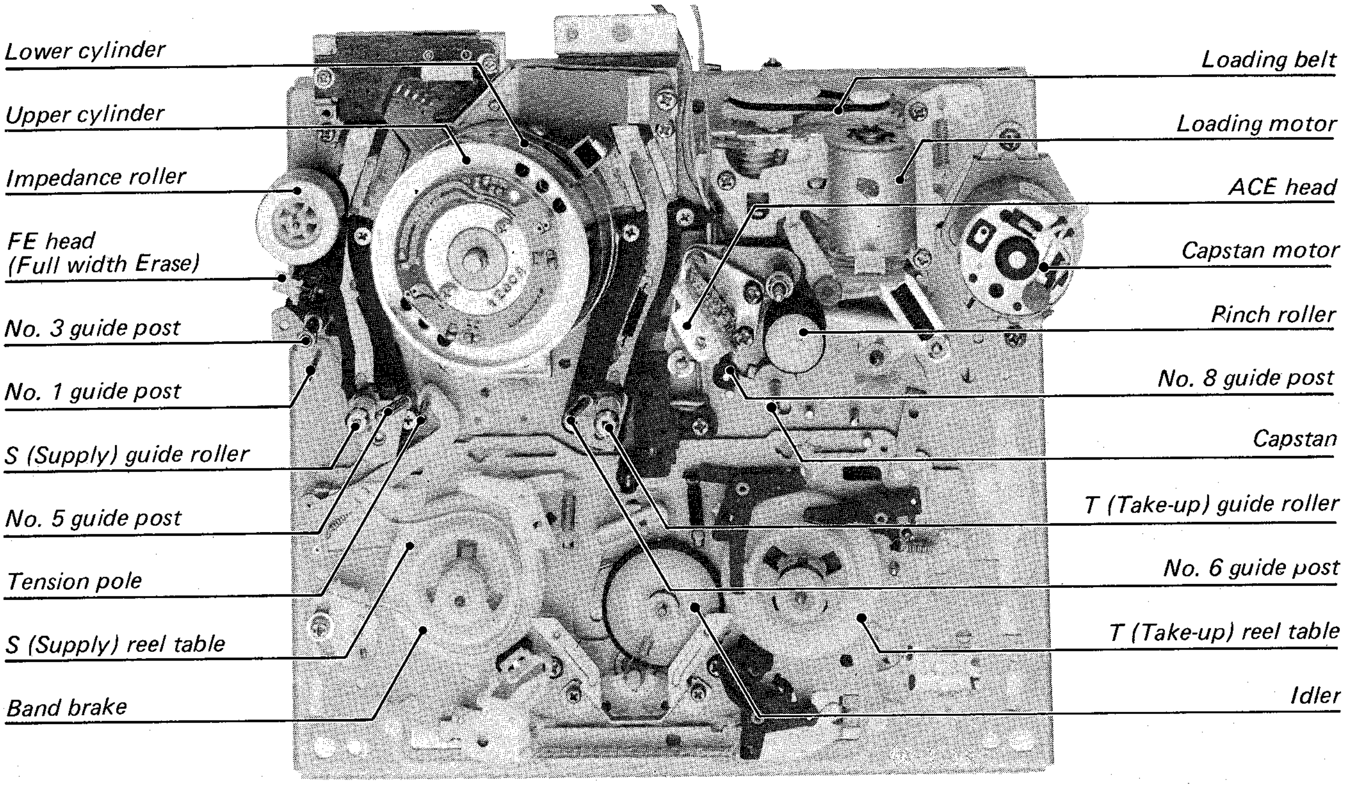
2-5. Audio Circuit 37

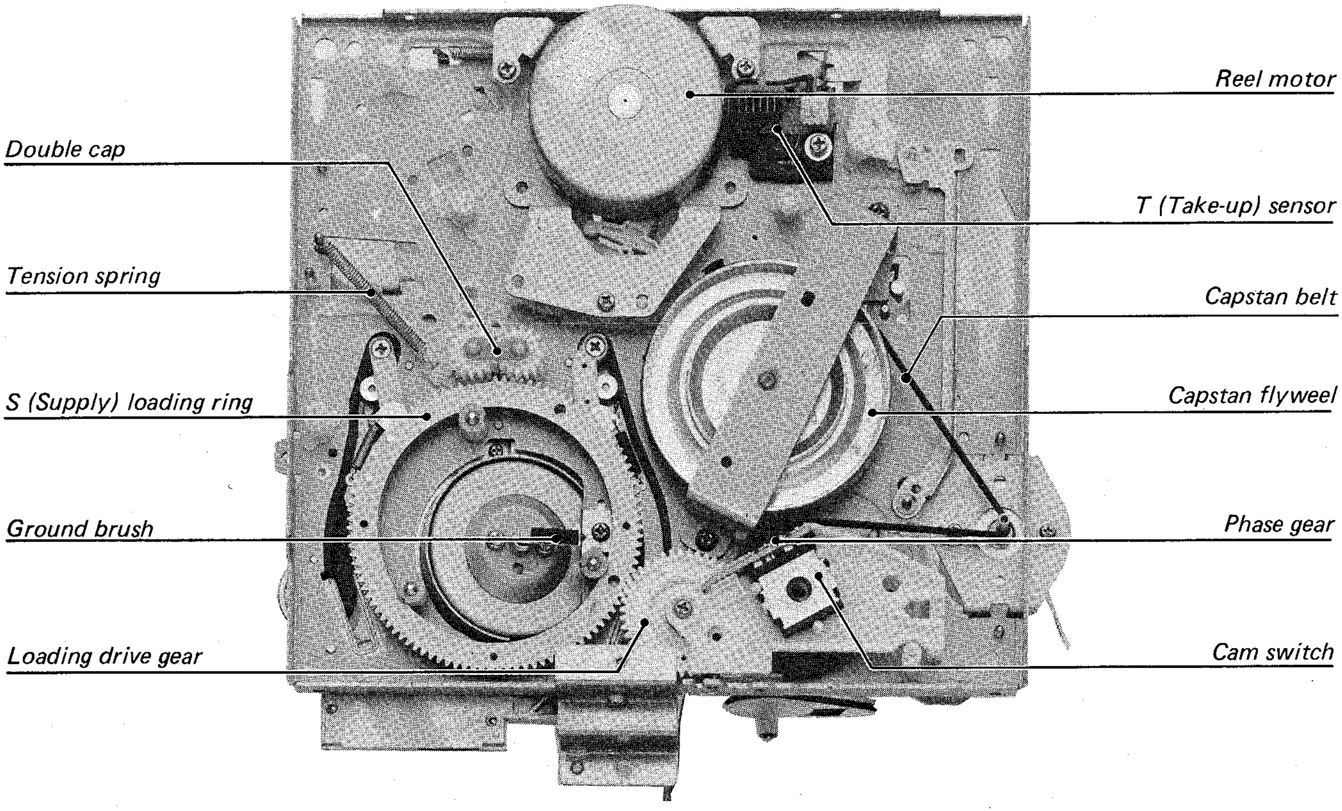
2-6. Wireless Remote Control Circuit. 38

1. MECHANICAL ADJUSTMENT

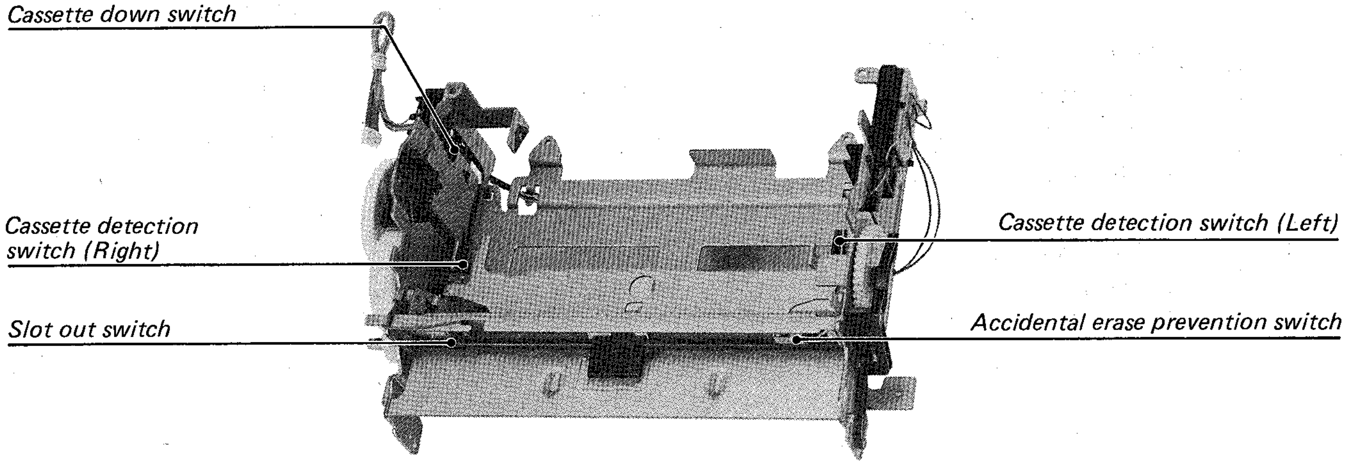
1-1. Mechanical Parts Location

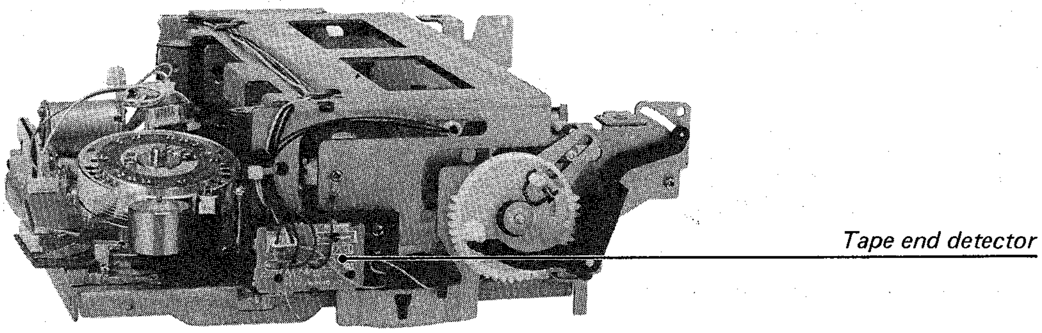
1-1-1 Top View

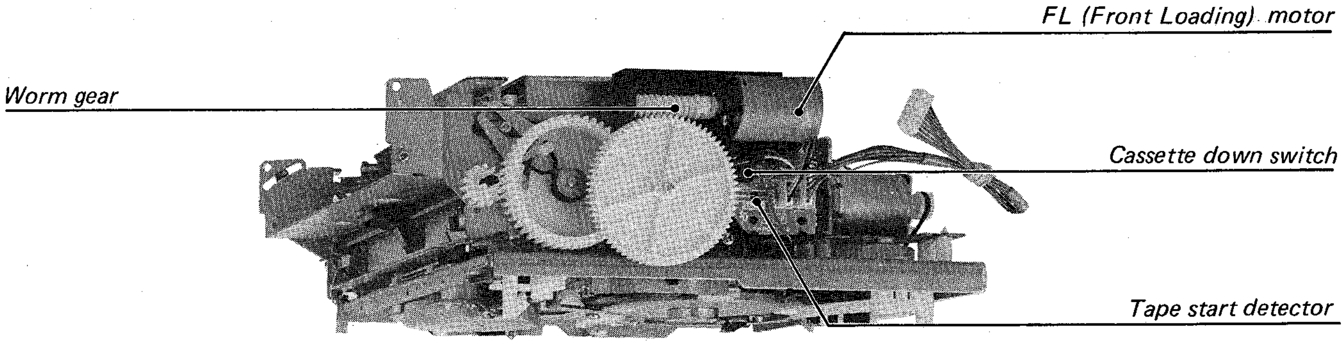

Lower cylinder
Upper cylinder
Impedance roller
FE head
(Full width Erase)
No. 3 guide post
No. 1 guide post
S (Supply) guide roller
No. 5 guide post
Tension pole
S (Supply) reel table
Band brake
Loading belt
Loading motor
ACE head
Capstan motor
Pinch roller
No. 8 guide post
Capstan
T (Take-up) guide roller
No. 6 guide post
T (Take-up) reel table
Idler


Double cap
Tension spring
S (Supply) loading ring
Ground brush
Loading drive gear
Reel motor
T (Take-up) sensor
Capstan belt
Capstan flyweel
Phase gear
Cam switch

1-1-3 Front Loading Mechanism


Cassette down switch
Cassette detection switch (Right)
Slot out switch
Cassette detection switch (Left)
Accidental erase prevention switch


Tape end detector


FL (Front Loading) motor
Worm gear
Cassette down switch
Tape start detector

1-2. Servicing Jig List

Table 1-2-1

Name	Part code	Q'ty	Sketch No.
Alignment tape (MH-2)	70909094	1	①
Torque gauge	70909098	1	②
Back tension cassette gauge	70909103	1	③
Height gauge	70909113	1	④
Taper nut driver	70909162	1	⑤
Torque cassette gauge (KT-300NR)	70909199	1	⑥
Dental mirror	70954003	1	⑦

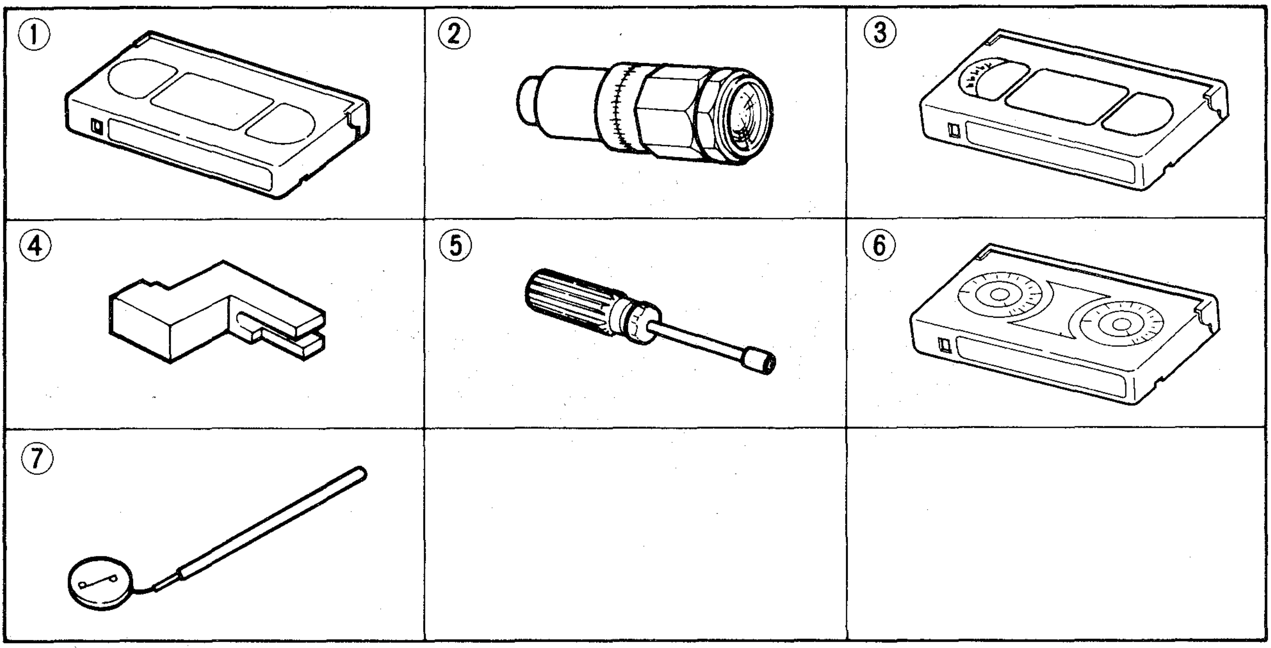


Fig. 1-2-1

1-3. Main Parts Replacement

1-3-1 Front Loading

(1) Front loading assembly

< Replacement >

1) Disconnect the relay cable connector from the Logic P.C. board.
2) Loosen 4 mounting screws on the deck top shield plate, and remove the shield plate.
3) Remove 2 screws securing the front loading assembly on the base.
4) First, pull the front loading assembly forward, unhook claws from the holes on the main base, and then take out the loading assembly upward, and replace it.

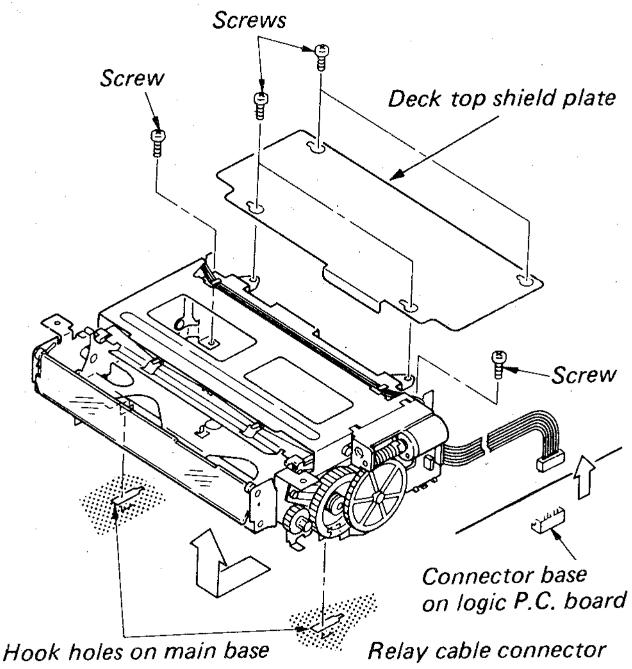

Screws
Screw
Deck top shield plate
Screw
Connector base
on logic P.C. board
Hook holes on main base
Relay cable connector

Fig. 1-3-1 Front loading assembly replacement

(2) Door

< Replacement >

1) Slide the door rightward and remove the left door shaft from the guide bracket while warping the door slightly forward. Next, disengage the right door shaft.
2) Remove a door spring from the right door shaft and replace it.
3) Insert the door spring into the right door shaft of the new door (in direction shown by the arrow).
4) Insert the tip of door spring into the spring hook (hole) on the guide bracket, and insert the right door shaft into the guide bracket.
5) Insert the left door shaft into the guide bracket while warping the door slightly forward. In this case, make sure that the door lever pin is positioned as shown in Fig. 1-3-4.

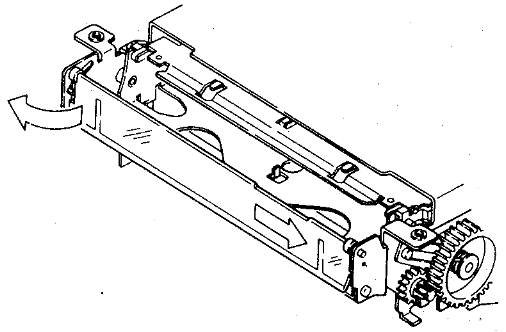


Fig. 1-3-2 Door replacement (1)

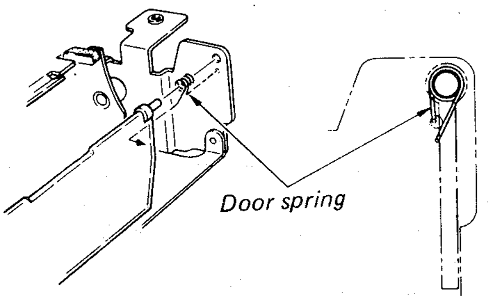

Door spring

Fig. 1-3-3 Door replacement (2)

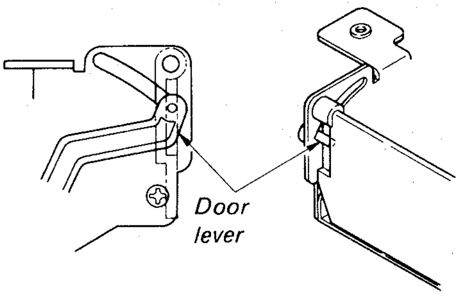


Fig. 1-3-4 Door replacement (3)

1-3. Main Parts Replacement

1-3-1 Front Loading

(1) Front loading assembly

< Replacement >

1) Disconnect the relay cable connector from the Logic P.C. board.
2) Loosen 4 mounting screws on the deck top shield plate, and remove the shield plate.
3) Remove 2 screws securing the front loading assembly on the base.
4) First, pull the front loading assembly forward, unhook claws from the holes on the main base, and then take out the loading assembly upward, and replace it.

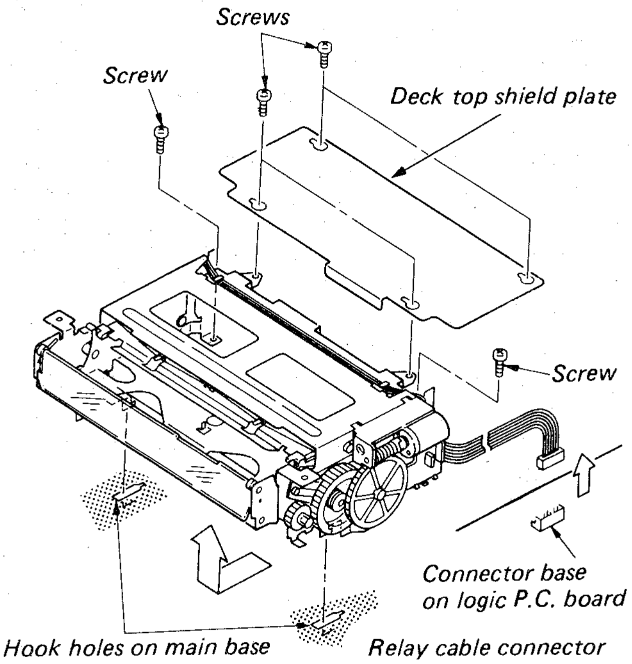

Screws
Screw
Deck top shield plate
Screw
Connector base
on logic P.C. board
Hook holes on main base
Relay cable connector

Fig. 1-3-1 Front loading assembly replacement

(2) Door

< Replacement >

1) Slide the door rightward and remove the left door shaft from the guide bracket while warping the door slightly forward. Next, disengage the right door shaft.
2) Remove a door spring from the right door shaft and replace it.
3) Insert the door spring into the right door shaft of the new door (in direction shown by the arrow).
4) Insert the tip of door spring into the spring hook (hole) on the guide bracket, and insert the right door shaft into the guide bracket.
5) Insert the left door shaft into the guide bracket while warping the door slightly forward. In this case, make sure that the door lever pin is positioned as shown in Fig. 1-3-4.

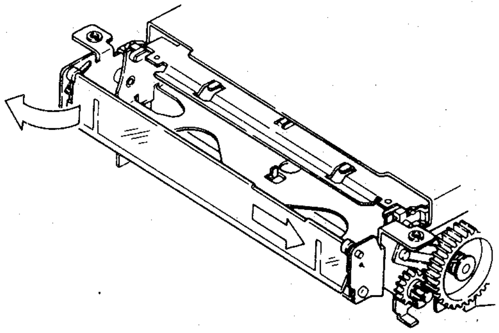


Fig. 1-3-2 Door replacement (1)

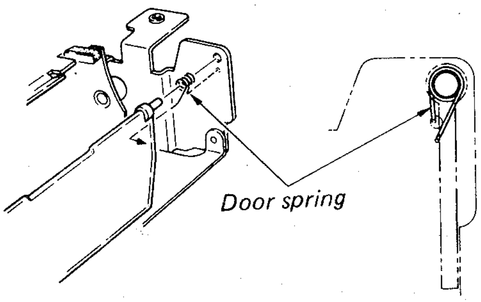

Door spring

Fig. 1-3-3 Door replacement (2)

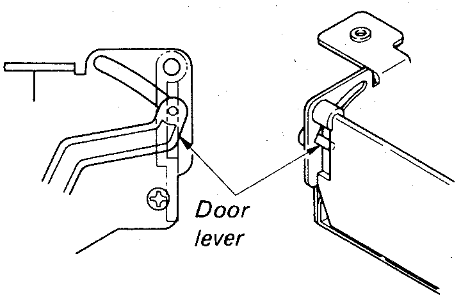


Fig. 1-3-4 Door replacement (3)

(3) Cassette detection switches, L, R

< Replacement >

1) Remove the front loading assembly from the chassis.
2) Place the front loading assembly upside down.
3) Unsolder leads from the switch terminals using a soldering iron. In this case, the unsoldering work will be made easily if the cassette holder is moved down by rotating the coupling section of the worm gear and the motor. (Do not touch your hand to gear teeth.)
4) Remove screws securing the switches and replace the switches.
5) When mounting new switches, perform the above steps in reverse order.

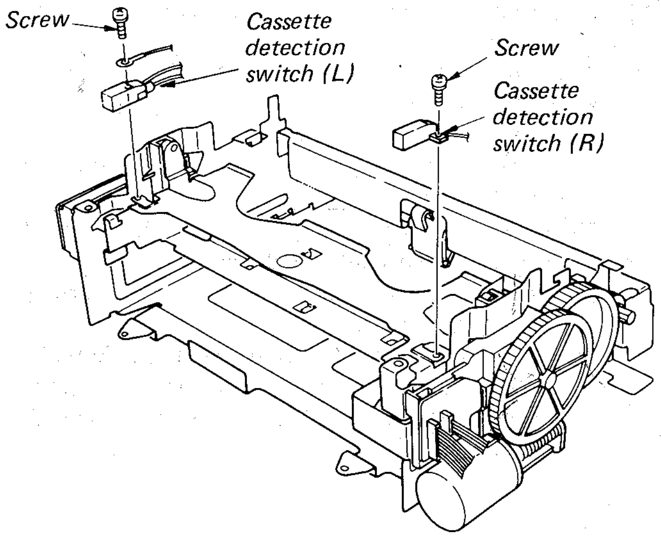

Screw
Cassette detection switch (L)
Screw
Cassette detection switch (R)

Fig. 1-3-5 Replacement of cassette detector

(4) Cassette down switch

< Replacement >

1) Remove the front loading assembly from the chassis.
2) Remove the FL P.C. board (R) unhooking the mold claws on the guide R.
3) Remove the screw securing the switch and take out the switch.
4) Unsolder the leads from the switch terminals using a soldering iron.
5) When remounting a new switch, perform the above steps in reverse order.

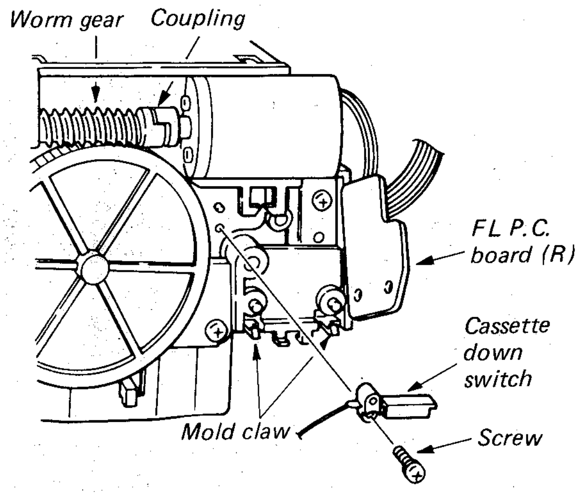

Worm gear
Coupling
FL P.C. board (R)
Cassette down switch
Mold claw
Screw

Fig. 1-3-6 Cassette down switch replacement

(5) Slot out switch and accidental erase prevention switch

1) Remove the front loading assembly from the chassis.
2) Place the loading assembly with the door facing upward.
3) Unsolder the leads from the switch terminals, using the soldering iron.
4) Remove the screw securing the switch.
5) When mounting the switch, perform the above steps in reverse order.

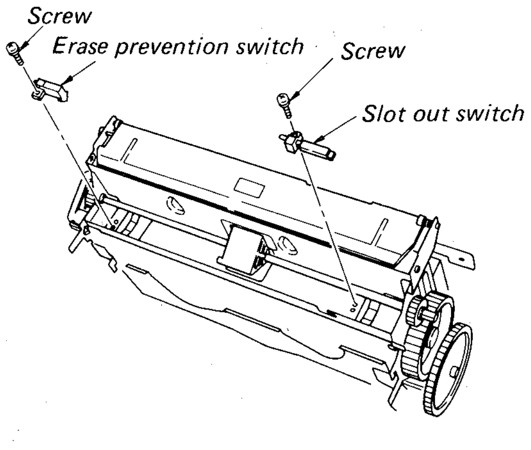

Screw
Erase prevention switch
Screw
Slot out switch

Fig. 1-3-7 Replacement of slot out switch and erase prevention switch

(6) FL motor assembly

< Replacement >

1) Remove the front loading assembly from the chassis.
2) Unsolder the leads from the motor terminals, using the soldering iron.
3) Remove the screws securing the FL motor assembly on the guide R and remove the assembly.
4) When mounting the assembly, perform the above steps in reverse order.

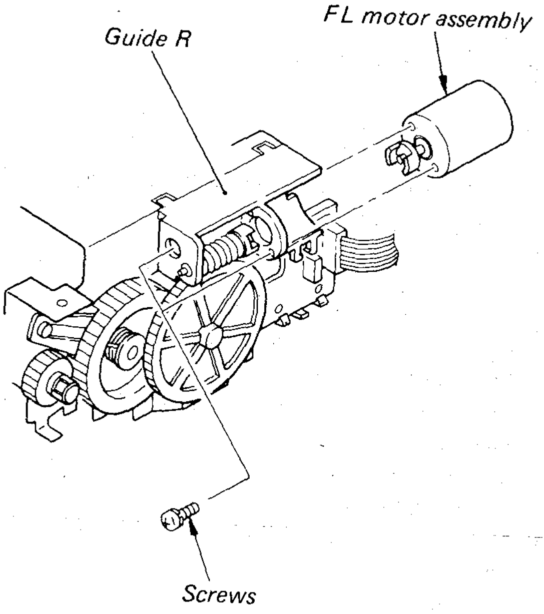

Guide R
FL motor assembly
Screws

Fig. 1-3-8 Replacement of motor assembly

(7) Photo transistor

< Replacement >

1) Remove the front loading assembly from the chassis.
2) Remove the FL P.C. board (R) unhooking the mold claws on the guide R.
3) Unsolder the photo transistor from the FL P.C. board, using the soldering iron.
4) Bend leads of a new photo transistor as shown in Fig. 1-3-11.
5) When remounting the transistor, perform the above steps in reverse order.
6) The replacement method will apply to both the photo transistors on the left and right FL P.C. boards.

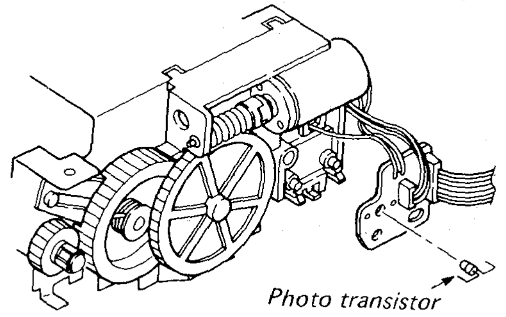


Photo transistor

Fig. 1-3-9 Replacement of photo transistor on FL P.C. board (R)

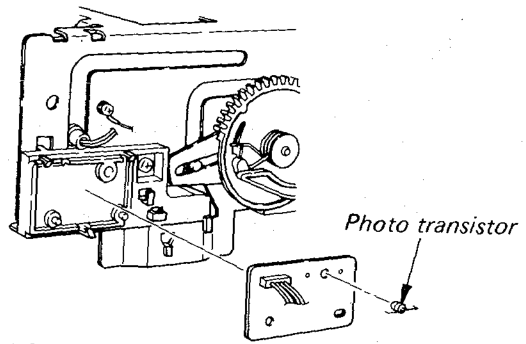


Photo transistor

Fig. 1-3-10 Replacement of photo transistor on FL P.C. board (L)

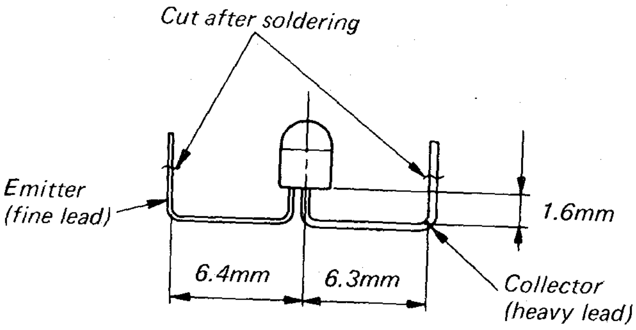

Cut after soldering
Emitter (fine lead)
1.6mm
6.4mm
6.3mm
Collector (heavy lead)

Fig. 1-3-11 Forming of photo transistor leads

1-3-2 Cylinder

(1) Upper Cylinder Assembly

< Inspection >

1) Check video heads damaged or worn out.
2) Check video heads clogging.
   (Replace the upper cylinder assembly if the clogging is not remedied after cleaning.)

< Replacement >

1) Unsolder the relay terminals ⑥ (at the marks △, 2 pairs – in total 4 locations) on the head relay P.C. board ①.
   The solder will be removed easily using a desoldering wire.
2) Remove two screws ② and remove the upper cylinder assembly.
3) Clean a new upper cylinder assembly ③ and the surface of the flange for mounting ⑤, using a cleaning kit.
4) Align phases of the white part of P.C. board ① and P.C. board ④ and then mount the upper cylinder ③. (Tightening torque ; 3 – 4 kg-cm.)
5) Perform the tape transport adjustment.

(2) Cylinder motor

< Inspection >

1) Apply power to the cylinder motor separately.
2) If the motor does not rotate, replace the rotor or the stator.

< Rotor replacement >

1) Remove the ground cap ①.
2) Remove two rotor screws ② and replace the rotor ③.
   (Tightening torque ; 3 – 4 kg-cm.)

Note: Mount a new rotor, matching the phase decision holes of rotor and preliminary pressure boss ④. (Fig. 1-3-14, 15)

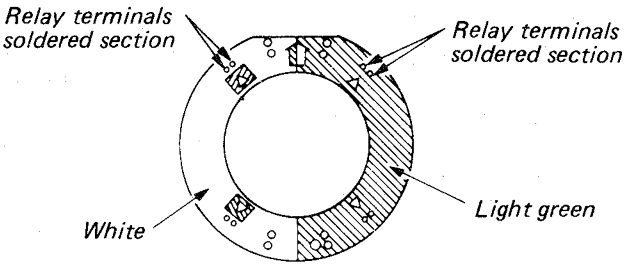

Relay terminals soldered section
Relay terminals soldered section
White
Light green

Fig. 1-3-12 Head relay P.C. board ①

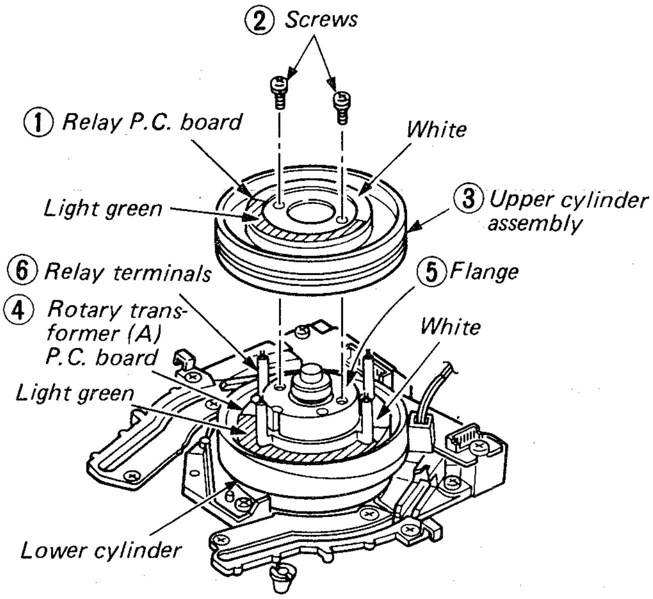

② Screws
① Relay P.C. board
White
Light green
③ Upper cylinder assembly
⑥ Relay terminals
⑤ Flange
④ Rotary transformer (A) P.C. board
White
Light green
Lower cylinder

Fig. 1-3-13 Upper cylinder replacement

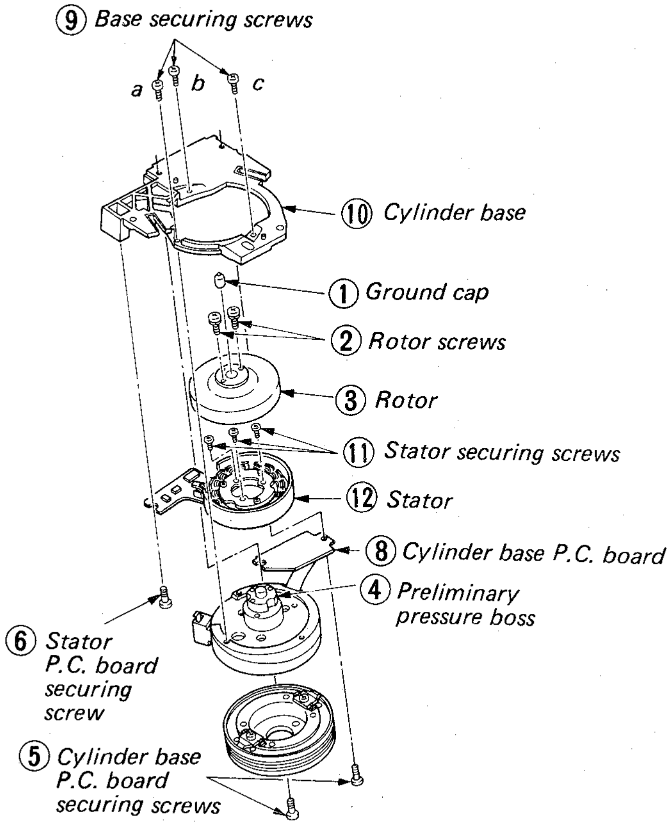

⑨ Base securing screws
a
b
c
⑩ Cylinder base
① Ground cap
② Rotor screws
③ Rotor
⑪ Stator securing screws
⑫ Stator
⑧ Cylinder base P.C. board
④ Preliminary pressure boss
⑥ Stator P.C. board securing screw
⑤ Cylinder base P.C. board securing screws

Fig. 1-3-14 Cylinder motor replacement

< **Stator replacement** >

1) Remove the cylinder complete assembly. (Refer to 1-3-2(3))
2) Remove two cylinder base P.C. board securing screws ⑤ and stator P.C. board securing screw ⑥. (Fig. 1-3-16)

Note: In this case, take care not to damage patterns of the R.T relay P.C. board. Also handle the cylinder base P.C. board ⑧ carefully so that the cylinder is not damaged with the P.C. board.

3) Remove three base securing screws ⑨ and remove the cylinder base ⑩ (Fig. 1-3-14).
4) Remove the rotor screws ② and the rotor ③. (Fig. 1-3-14)

Note: Follow the procedures under "< Rotor replacement >".

5) Remove the stator securing screws ⑪.
6) Pull out the stator ⑫ and replace it. (Tightening torque 1.5 – 2.5 kg)
7) When mounting the cylinder complete assembly, perform the above steps in reverse order.

Note: Sequence of tightening base securing screws ⑨ : tighten the screw a first, b and c in any order. (tightening torque is 3 – 4 kg-cm) (Fig. 1-3-14)

8) Perform the tape transport adjustment.

(3) Cylinder assembly

< **Inspection** >

1) Check to see that rotating surface of the lower cylinder has no damage such as scratches, crack, etc.
2) Check to see smooth rotation of the upper cylinder.
If abnormality is found, replace the cylinder(s).

< **Replacement** >

1) Remove the 6P connector (Video heads) ①, 5P connector (Cylinder motor) ②, and the dew heater ③.
2) Remove three screws ④.
3) Remove the cylinder assembly ⑤.

Note: In this case, move the impedance roller ⑥ in direction shown by the arrows.

4) Align position of a new cylinder to the cylinder base ⑦, taking care not to touch the video heads directly and not to damage the cylinder surface. When mounting the cylinder complete assembly, perform the above steps in reverse order.
5) Perform the tape transport adjustment.

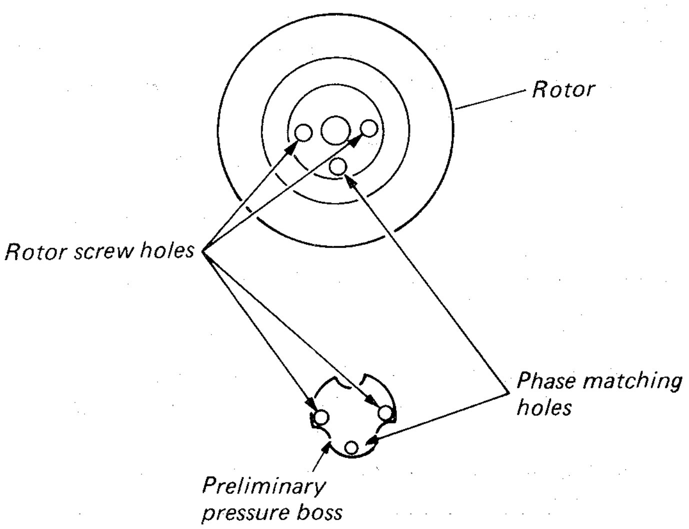

Rotor
Rotor screw holes
Phase matching holes
Preliminary pressure boss

Fig. 1-3-15 Phase matching between rotor and preliminary pressure boss

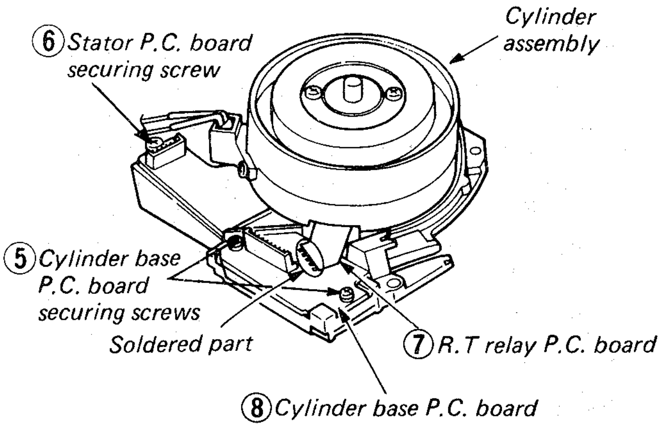

⑥Stator P.C. board securing screw
Cylinder assembly
⑤Cylinder base P.C. board securing screws
Soldered part
⑦R.T relay P.C. board
⑧Cylinder base P.C. board

Fig. 1-3-16 Relay P.C. board and cylinder base P.C. board

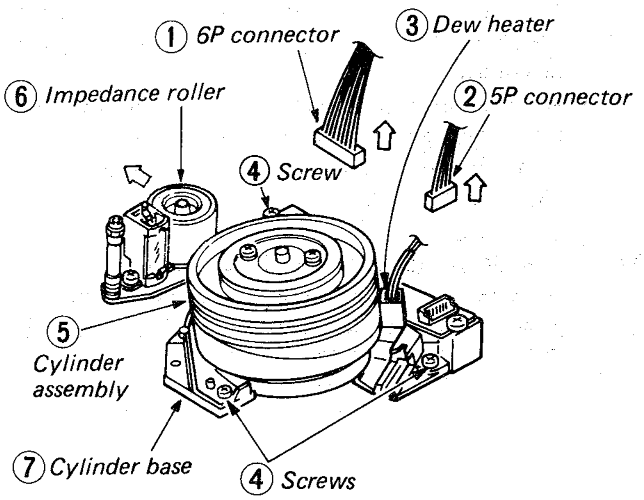

① 6P connector
③ Dew heater
⑥ Impedance roller
② 5P connector
④ Screw
⑤ Cylinder assembly
⑦ Cylinder base
④ Screws

Fig. 1-3-17 Cylinder assembly replacement

1-3-3 Transport system parts replacement

(1) ACE Head assembly replacement

1) Disconnect a 6P connector from the ACE P.C. board ⑧.
2) Turn the ACE height adjusting nut ⑦ counterclockwise and remove the nut in order to remove ACE base assembly ⑤ . (Refer to Fig. 1-3-18).

> **Note:** Note positions of the ACE base ① and the taper nut ③.

3) Remove the E-ring ⑨ and the ACE azimuth adjusting screws ② in order to remove the ACE head assembly.
4) Remove the ACE P.C. board ⑧ from the ACE head assembly ⑪.
5) Replace the ACE head assembly, according to the reverse procedures.
6) Rotate the ACE height adjustment nut ⑦ until the ACE base and the upper position of the taper nut have the same position as noted in the step 2) above.
7) After mounting, perform the tape transport adjustment, starting from the first step.

> **Note:** Since direct mounting of the ACE torsion spring is difficult, first insert the tip of the spring into the hole on the main base and then hook the opposite tip of the spring to the ACE base ① which has been inserted into the ACE post ⑫.

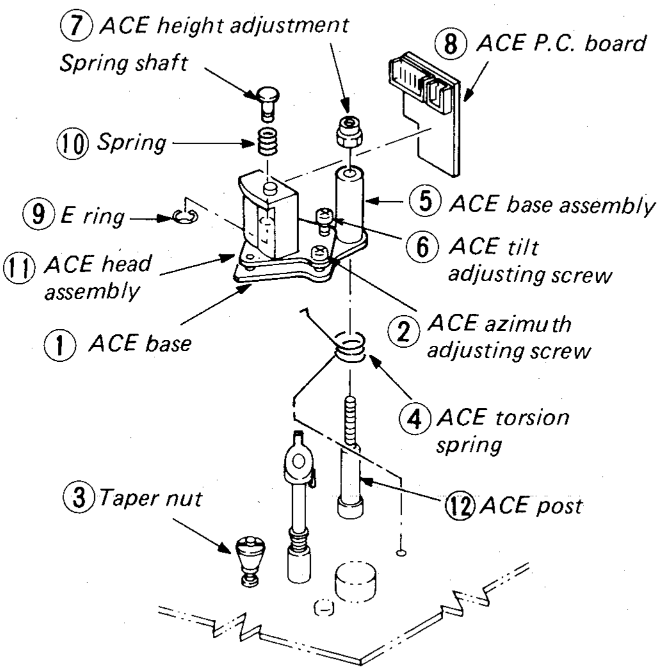

⑦ ACE height adjustment
Spring shaft
⑧ ACE P.C. board
⑩ Spring
⑨ E ring
⑤ ACE base assembly
⑪ ACE head assembly
⑥ ACE tilt adjusting screw
① ACE base
② ACE azimuth adjusting screw
④ ACE torsion spring
③ Taper nut
⑫ ACE post

Fig. 1-3-18 Replacement of ACE head assembly

(2) Guide sleeve replacement

< No. 3 guide sleeve replacement >

1) Rotate the No. 3 guide nut ① counterclockwise and remove the No. 3 guide nut ① and flange ② as shown in Fig 1-3-22. When replacing a new flange, perform the above steps in reverse order.
2) After the replacement, preset height of the lower flange as shown in Fig. 1-3-19, using the guide height gauge.
3) After completion of preset, perform adjustments by following the procedures for Linearity Adjustment, item 4) of the Tape Transport Adjustment. (Refer to 1-4-4 (3))

> **Note:** The flange ② arranged in upper and lower positions is a common part and can be used either place and upside down. (Fig. 1-3-22)

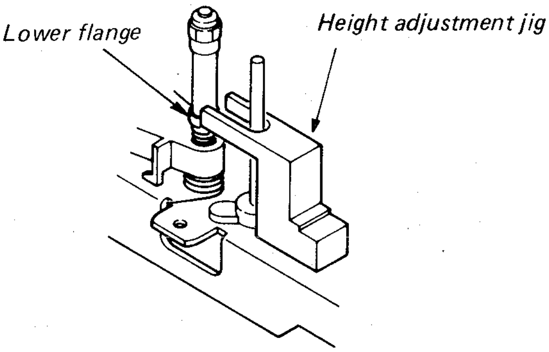

Lower flange
Height adjustment jig

Fig. 1-3-19 No. 3 guide preset

< No. 8 guide sleeve replacement >

1) Remove No. 8 cap ① through the spring ⑦ in this sequence as shown in Fig. 1-3-20. When reassembling, perform the above steps in reverse order.
2) After completion of the replacement, preset height of the lower flange as shown in Fig. 1-3-21 using the guide height gauge.

> **Note:** This adjustment is a basic reference of tape transport system, so extreme care should be paid in the adjustment.
> When mounting the No. 8 guide cap ①, mount it with its slant surface facing to the cassette side.

3) After completion of the preset adjustment, perform adjustments by following the procedures for the linearity adjustment, item 4) of the tape transport adjustment. (Refer to 1-4-4 (3))

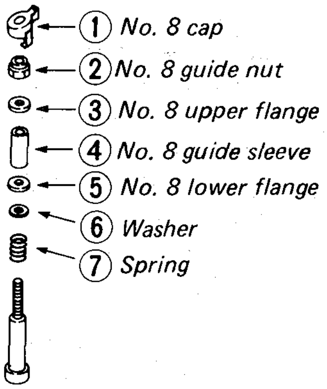

① No. 8 cap
② No. 8 guide nut
③ No. 8 upper flange
④ No. 8 guide sleeve
⑤ No. 8 lower flange
⑥ Washer
⑦ Spring

Fig. 1-3-20 No. 8 guide replacement

(3) FE head replacement

1) Disconnect the 2P connector of the FE head.
2) Remove the FE head mounting screw ⑤ and the FE head ⑥ will be removed. Refer to Fig. 1-3-22.
3) Replace the new FE head and tighten the FE head mounting screw ⑤.
4) Connect 2P connector.
5) The replacement of the FE head causes little change in linearity. But confirm whether the associated adjustments have been not upset, starting check from the linearity adjustment, item 4) of the tape transport adjustment. (Refer to 1-4-4 (3))

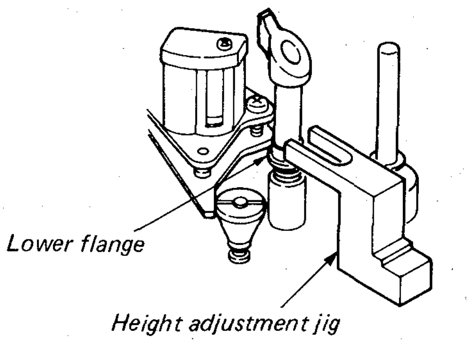

Lower flange
Height adjustment jig

Fig. 1-3-21 No. 8 guide preset

(4) Impedance roller replacement

1) Remove the washer ⑦ and replace the impedance roller ⑧ as shown in Fig. 1-3-22.

> **Note:** The polyslider must be inserted between the impedance roller ⑧ and the entrance lever ⑩, take care not to miss it. An impedance roller with scratches may damage the tape, so carefully handle it.
> If your fingers touch the surface of the impedance roller, clean the surface with alcohol.

2) After replacement of the impedance roller, perform the adjustment from the linearity adjustment, item 4) in the tape transport adjustment. (Refer to 1-4-4 (3))

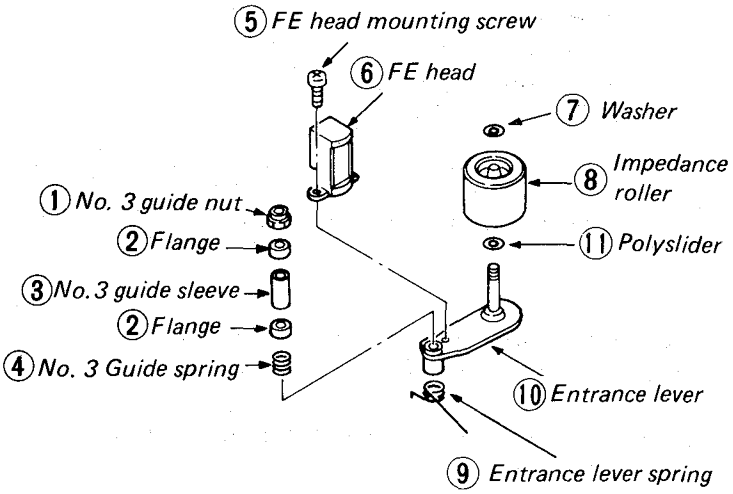

⑤ FE head mounting screw
⑥ FE head
⑦ Washer
⑧ Impedance roller
① No. 3 guide nut
② Flange
⑪ Polyslider
③ No. 3 guide sleeve
② Flange
④ No. 3 Guide spring
⑩ Entrance lever
⑨ Entrance lever spring

Fig. 1-3-22 Replacement of No. 3 guide and FE head

(5) S, T Guide rollers replacement

Same replacement procedures will be applied for both S- and T-guide rollers.

1) Loosen the set screw ② shown in Fig. 1-3-23.
2) Turn the guide roller ① counterclockwise and remove it.
3) As the O-ring may stick to the guide roller removed, remove the O-ring and insert it on a new guide roller.
4) When remounting, perform the above steps in reverse order.

> **Note:** When tightening the set screw ②, temporarily tighten it with light pressure. If it is tighten too hard, associated adjustments can not be made. The S-guide roller has a red mark on upper flange and the T-guide roller has a black mark on upper flange. Do not exchange them when remounting.

5) After completion of the replacement, perform adjustment from the linearity adjustment item 4) in the tape transport adjustment. (Refer to 1-4-4 (3))

(6) S, T Sliders replacement

1) Remove the cylinder assembly.
2) Place the VTR vertically and remove the bottom cover.
3) Remove the connecting screw ① shown in Fig. 1-3-24.
4) Move the slider up to the loading position turning loading motor with your hand, and the slider can be removed.
5) Remove the guide roller and reinstall it in a new slider according to the steps stated in (5) above.
6) When replacing the slider, perform the above steps in reverse order.
7) After completion of the replacement, perform adjustment from tape transport system adjustment. (Refer to 1-4-4 (3))

> **Note:** When the slider is replaced, always apply grease to the slider as shown in Fig. 1-3-24.

1-3-4 Pinch roller assembly replacement

1) Remove the washer ① and disconnect the pinch connector from the pinch roller assembly.
2) Remove the washer ② and remove the pinch roller assembly upward.
3) Clean the pinch post and apply grease on it.
4) Replace the pinch roller assembly according to the above steps in reverse order.
5) After completion of the replacement, perform adjustment from 1-4-4 (3).

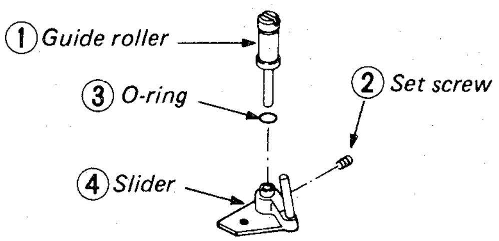


Fig. 1-3-23 Guide roller replacement

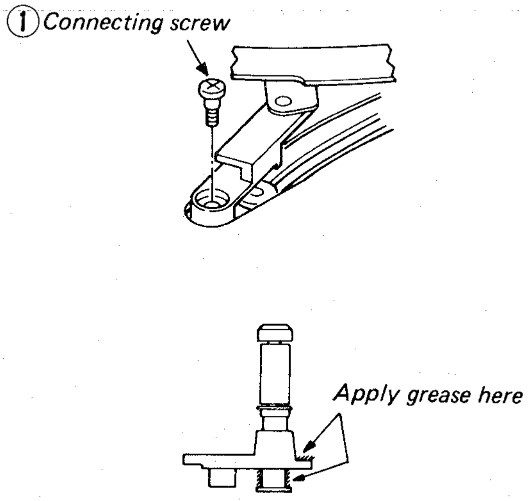


Fig. 1-3-24 S, T slider replacement

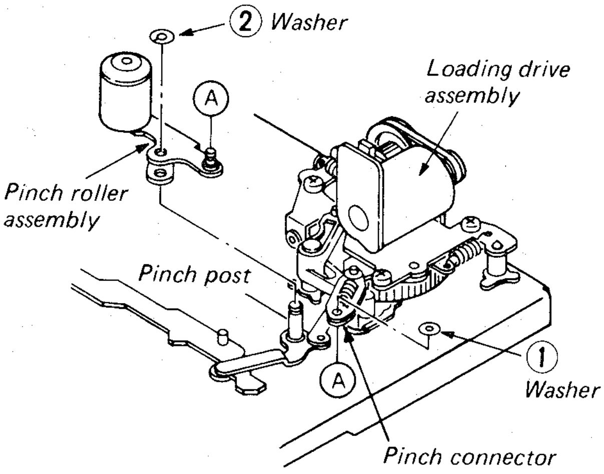
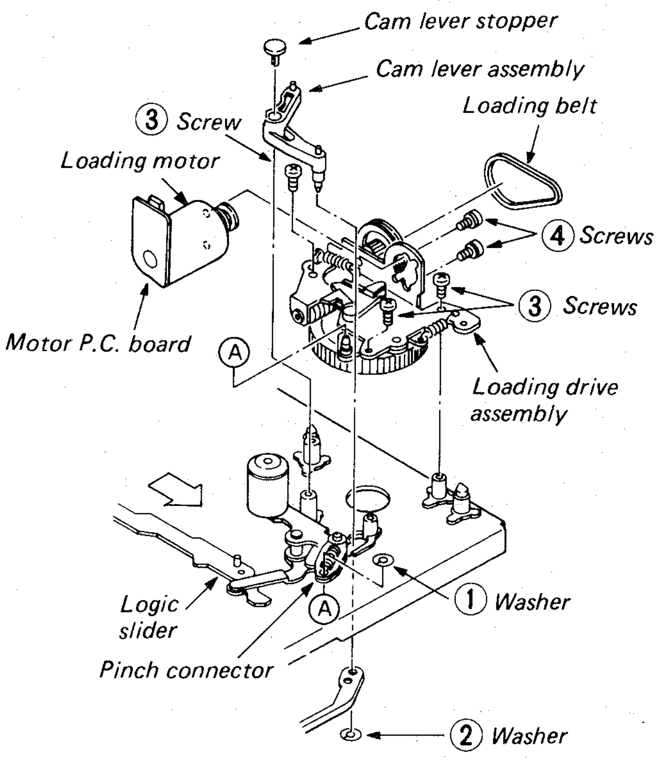


Fig. 1-3-25 Pinch roller replacement

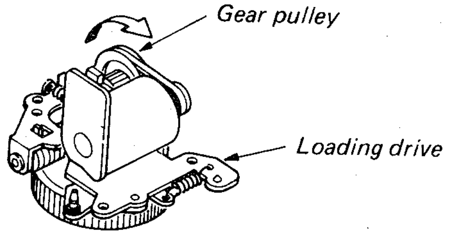
1-3-5 Loading motor replacement

1) Remove the motor P.C. board from the motor, taking care not to damage wire leads.
2) Remove the washer ① and disconnect the pinch connector.
3) Remove the cam lever stopper and the washer ②, and remove the cam lever assembly upward.
4) Turn the gear pulley in direction shown by the arrow until it stops to set the FF/REW mode. (Refer to Fig. 1-3-27)
5) Remove the screws ③ and remove the loading drive assembly.
6) Remove the loading belt and the screws ④ , and remove the motor.
7) Replace the motor.
   When replacing with a new motor, perform the above steps in reverse order, taking care of polarities, (+ polarity should be located on upside).
8) When mounting the loading drive assembly on the main base, first push the logic slider rightward (shown by the arrow) until it stops, and then mount the drive assembly.
9) Confirm timing of the phase gear, refer to the item 1-4-1.



Cam lever stopper
Cam lever assembly
Loading belt
③ Screw
Loading motor
④ Screws
③ Screws
Motor P.C. board
Ⓐ
Loading drive assembly
Logic slider
Ⓐ
① Washer
Pinch connector
② Washer

Fig. 1-3-26 Loading motor replacement

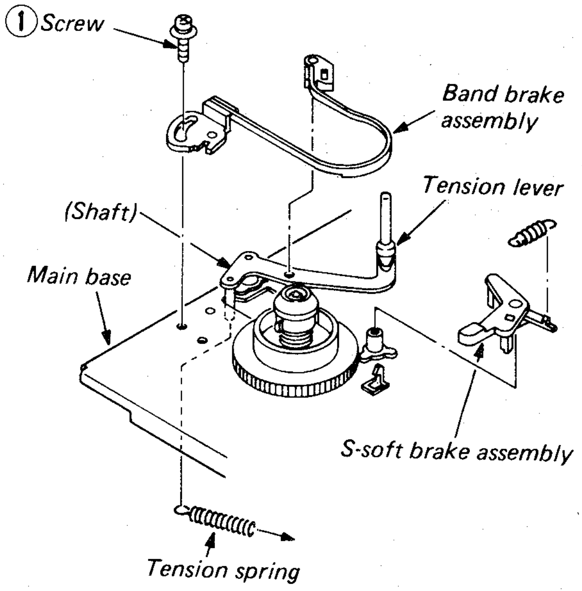


Gear pulley
Loading drive

Fig. 1-3-27 Loading drive · FF mode

1-3-6 Band brake assembly replacement

1) Remove the S-soft brake assembly.
2) Remove a tension spring from a tension lever.
3) Remove the screw ① and remove the tension lever and the band brake assembly from the main base.
4) Remove the band brake assembly from the tension lever and replace the band brake assembly.
5) Clean the shaft of the tension lever and then apply one or two drops of oil. When replacing with a new band brake assembly, perform the above steps in reverse order.
6) After completion of the replacement, check position of the tension pole and its adjustment (refer to 1-4-2) and check the backtension (refer to 1-4-3).



①Screw
Band brake assembly
Tension lever
(Shaft)
Main base
S-soft brake assembly
Tension spring

Fig. 1-3-28 Band brake assembly replacement

1-3-7 Cam switch replacement

1) Remove the screw ① and the cam switch bracket.
2) To remove the cam switch, move it upward with a screwdriver while opening the claw of the cam switch bracket.
3) Perform the phase matching adjustment (timing check), referring to the item 1-4-1.
4) Replace the cam switch and mount it on the cam switch bracket.
5) When mounting the cam switch on the phase gear shaft, mount the cam switch while pushing the external rim of the cam switch in the direction shown by the arrow.
(If the hole D of the cam switch and the cutout D of the phase gear shaft are not matched, (overlapped), turn the cam switch until the hole D matches.)

(Deck bottom side)

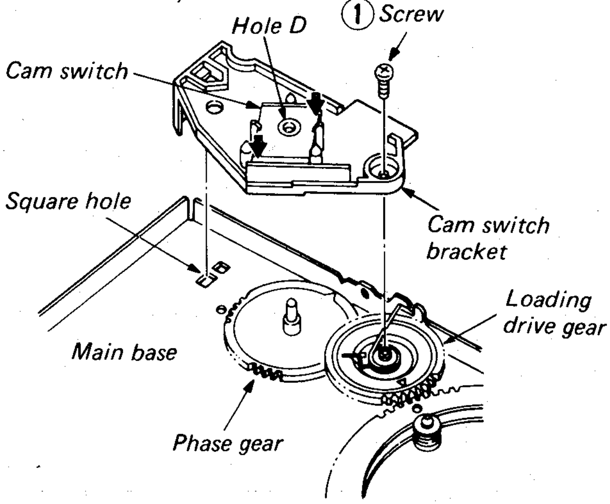

Hole D
① Screw
Cam switch
Square hole
Cam switch bracket
Loading drive gear
Main base
Phase gear

Fig. 1-3-29 Cam switch replacement

1-3-8 T-Sensor Assembly Replacement

1) Disconnect 3P and 6P connectors.
2) Remove the screw ①.
3) Remove the sensor assembly ②.
4) When reinstalling a new sensor, perform the above steps in the reverse order.

Note: Since the Hall element is glued on the sensor holder, take care the hall element is not torn off during installation.

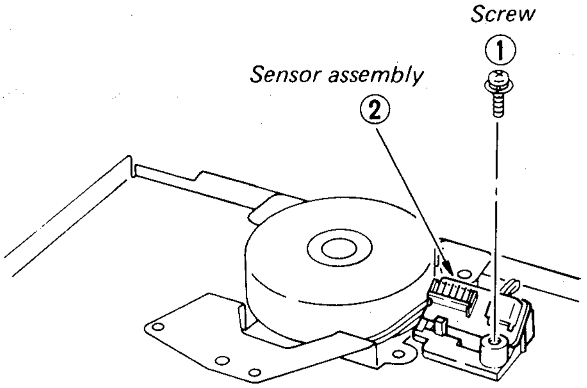

Screw
①
Sensor assembly
②

Fig. 1-3-30 T-sensor assembly replacement

1-3-9 Main brake assembly replacement

1) The brake assembly has the mold claws which allow one touch installation or removal.

Note: When replacing, take care not to touch the brake pad surface.

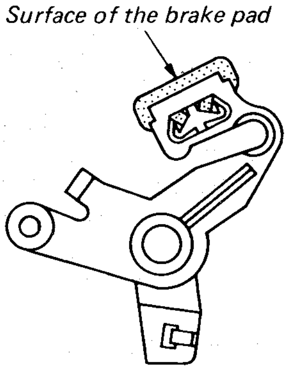

Surface of the brake pad

Fig. 1-3-31 Main brake assembly replacement

1-3-10 Ground brush replacement

1) Remove a screw ① and the brush.
2) Clean the ground cap with alcohol.
3) Replace the brush.
   Mount a new brush so that it can contact the center of the ground cap.

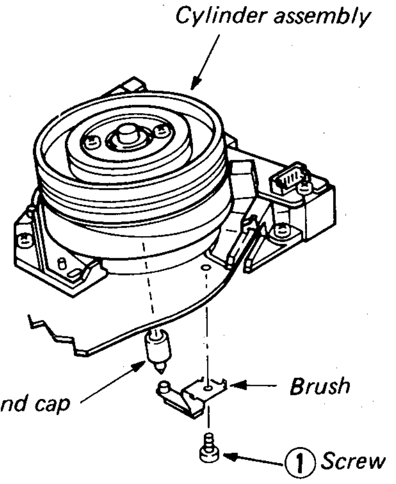

Cylinder assembly
Ground cap
Brush
① Screw

Fig. 1-3-32 Brush replacement

1-3-11 Reel table replacement

(1) Supply reel table assembly

1) Remove the S-soft brake spring ⑨ from the S-soft brake ① (Refer to Fig. 1-3-33).
2) Remove the S-soft brake ①.
3) Remove the tension spring ② from the tension lever ③.
4) Remove the screw ④, then remove the tension lever ③ and the band brake assembly ⑤.

> **Note:** Take care not to damage the mold claw of the band brake.

5) Remove the washer ⑥, then remove the S-reel table assembly ⑦ upward paying attention not to miss the spacers.

> **Note:** Move the S-brake assembly in the direction shown by the arrow before removing the reel table. Take care not to touch the pad surface of the S-brake. (Fig. 1-3-34)

6) After cleaning the reel shaft ⑧ with a cleaning kit, lubricate it with one or two drops of oil (lubrication kit).
7) When reinstalling the S-reel table assembly, temporarily move the S-brake assembly in the direction shown by the arrow, using a tweezers. (Fig. 1-3-34)
8) Replace the spacers and the retainer assembly on the reel shaft when the reel table mounts on the deck.
9) Mount the washer ⑥.
10) Mount the tension lever ③ and band brake assembly ⑤.

> **Note:** The mold claw of the band brake can be engaged smoothly into the hole of tension lever by pushing it slightly. Take care not to deform the mold claw and the tension lever by forcing them.

11) Hook the tension spring ② onto the tension lever ③.

> **Note:** In this case, take care not to give permanent deformation to the spring.

12) Mount the S-soft brake ①.
13) Mount the soft brake spring ⑨.

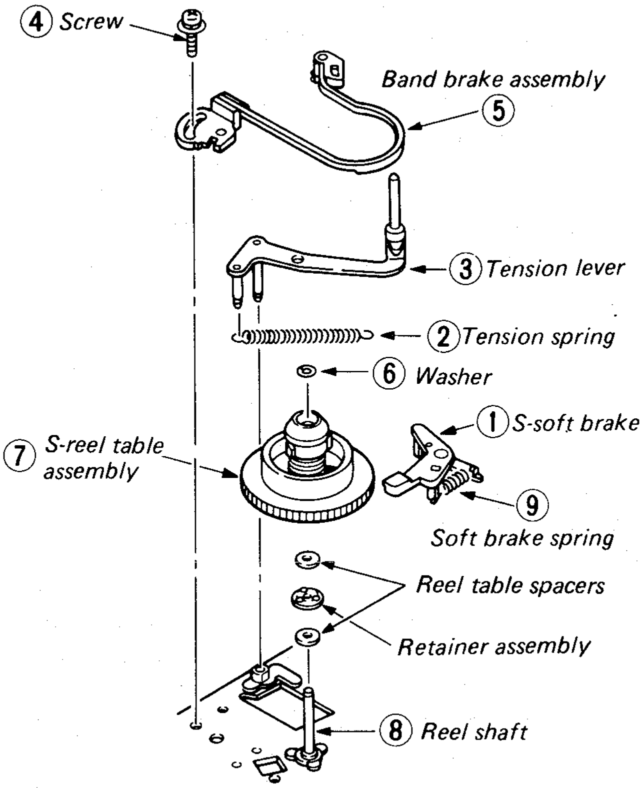

④ Screw
Band brake assembly
⑤
③ Tension lever
② Tension spring
⑥ Washer
① S-soft brake
⑦ S-reel table assembly
⑨
Soft brake spring
Reel table spacers
Retainer assembly
⑧ Reel shaft

Fig. 1-3-33 Supply reel table assembly replacement

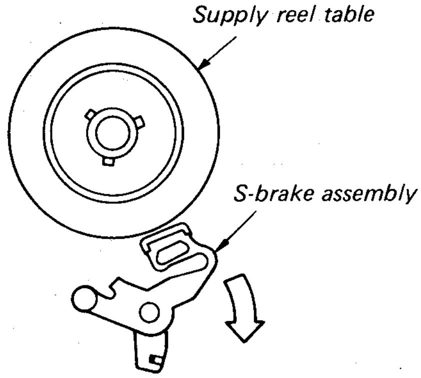

Supply reel table
S-brake assembly

Fig. 1-3-34 S-brake assembly

(2) Take-up reel table assembly

1) Remove the reverse brake spring ① from the reverse brake assembly ②.
2) Remove the reverse brake assembly ② from the main base.
3) Remove the T-soft brake spring ③ from T-soft brake assembly ④.
4) Remove the T-soft brake assembly ④ from the main base.
5) Remove the washer ⑤ , then move the T-brake assembly ⑩ in the direction shown by the arrow before removing the T-reel table assembly ⑥ . Take care not to touch the pad surface of T-brake assembly ⑩.
6) As the bearing is stained with oil, the reel table spacers ⑦ , thrust washer ⑧ , may stick to the T-reel table assembly and be removed with it. Take care not to miss them.
7) Clean the reel shaft ⑨ using a cleaning kit, and apply one or two drops of oil (lubrication kit) after the reel shaft has dried.
8) Replace the take-up reel table with a new one.
9) When mounting the take-up reel table ⑥, move the T-brake assembly ⑩ in the reverse direction shown by the arrow with tweezers.
10) Replace the spacers and the thrust washer on the reel shaft when the reel table mounts on the deck.

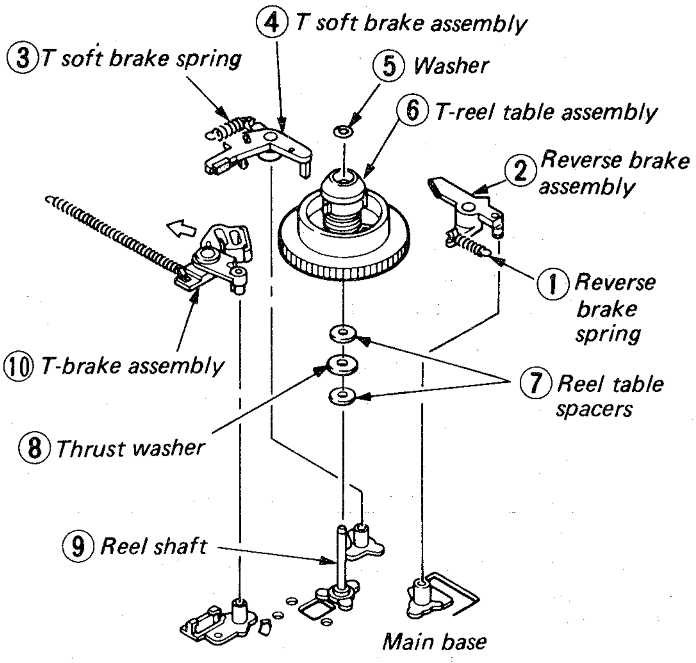

④ T soft brake assembly
③ T soft brake spring
⑤ Washer
⑥ T-reel table assembly
② Reverse brake assembly
① Reverse brake spring
⑩ T-brake assembly
⑦ Reel table spacers
⑧ Thrust washer
⑨ Reel shaft
Main base

Fig. 1-3-35 Take-up reel table assembly replacement

1-3-12 Idler assembly replacement

Assume the front loading assembly is removed.

1) Removal of reel motor assembly (Fig. 1-3-36)
   Turn over the set, and remove three screws①and screw ⑤ . Disconnect the 3P connector of the reel motor from the T-sensor assembly ④ . Move the idler assembly ③ in the direction shown by the arrow, then lift the reel motor assembly ② upward to remove it. After the reel motor was replaced, be sure to make adjustment of the reel torque referring to the item (2) in 1-4-3.

Note:
- Before remounting, always clean knurling surface of the motor pulley, using the cleaning kit. This is to prevent oil, dust, etc. from sticking on surface of the idler rubber.
- Screws ① and ⑤ are different in length.

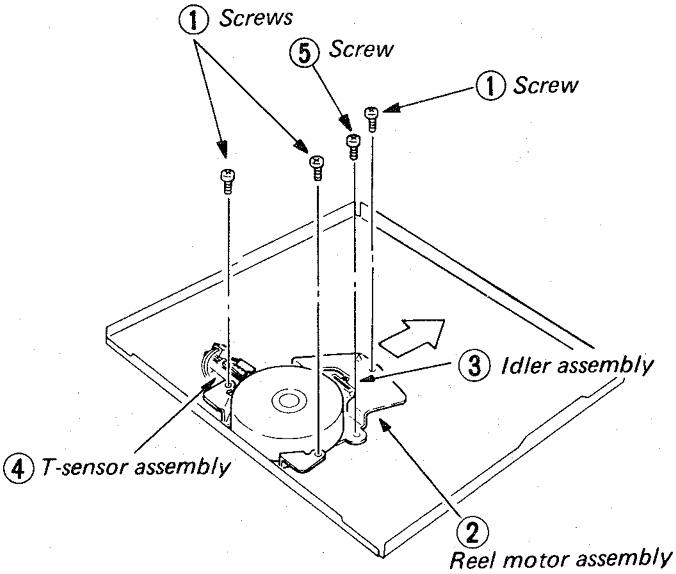

① Screws
⑤ Screw
① Screw
③ Idler assembly
④ T-sensor assembly
② Reel motor assembly

Fig. 1-3-36 Removal of reel motor assembly

2) Removal of idle stop bracket (Fig. 1-3-37)
Remove two screws ①, then remove the idle stop bracket.
3) Remove the T-reel table assembly as previously stated. (Refer to 1-3-11 (2))
4) Remove the polyslider ①. (Fig. 1-3-38)
5) Remove the idle spring ② from the post.
6) Move the idler assembly ③ in the direction as shown by the arrow. (Fig. 1-3-38)
7) Confirm that the idler assembly ③ is not caught with the main base. Lift the idler assembly upward.
8) When mounting, perform the above steps in reverse order.
9) When mounting the idler assembly, be sure to grease. (refer to the Fig. 1-3-40.)

> **Note:** Be sure to confirm that grease does not stain the rubber when the idler swings. Excessive amount of grease applied may stain the rubber.

10) Be sure to clean the idler rubber with the cleaning kit.

> **Note:** Make sure that the idler rubber is not stained with oil and dust. If stained, tape winding trouble may occur.

11) When assembling, perform the above steps in reverse order.
12) After the roller assemblying was replaced be sure to check the reel torque referring to the item 1-4-3(2).

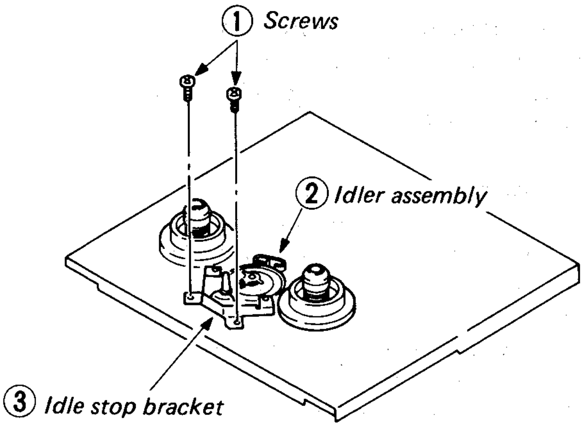

① Screws
② Idler assembly
③ Idle stop bracket

Fig. 1-3-37 Removal of idle stop bracket

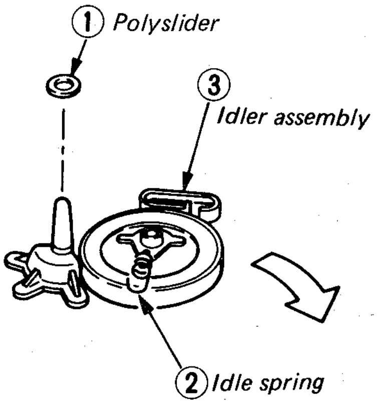

① Polyslider
③ Idler assembly
② Idle spring

Fig. 1-3-38 Idler assembly replacement (1)

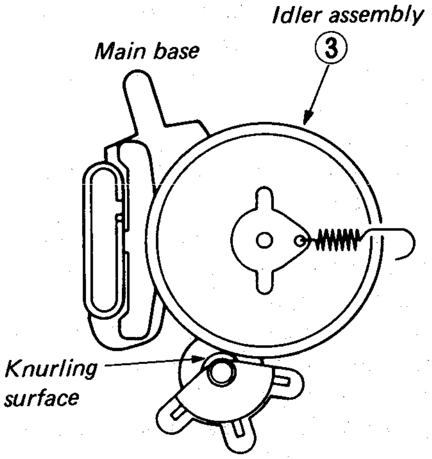

Idler assembly
Main base
③
Knurling surface

Fig. 1-3-39 Idler assembly replacement (2)

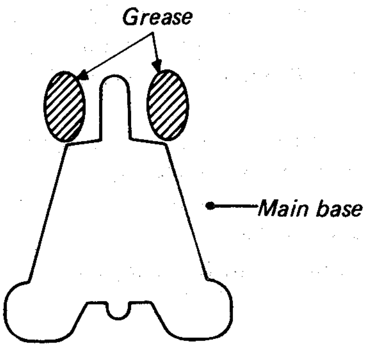

Grease
Main base

Fig. 1-3-40 Idler assembly replacement (3)

1-3-13 Capstan motor replacement

Before proceeding to this work remove the top cover, front panel, bottom plate, deck top shield plate, and the front loading assembly.

< Replacement >

(1) Disconnect wire harnesses for the capstan motor assembly and the FG coil assembly from the servo P.C. board.
(2) Remove two screws ①.
(3) Remove the capstan bracket assembly ②.
(4) Remove the capstan belt ③.
(5) Remove the capstan sleeve cap ④.
(6) Remove the capstan flywheel assembly ⑤.
(7) Remove three screws ⑥.
(8) Remove the FG coil assembly ⑦.
(9) Remove two screws ⑧.
(10) Remove the capstan motor assembly ⑨.

Note:
- Do not remove screws other than specified.
- Particularly, removing mounting screws for the capstan sleeve may affect serious influence on tape travel performance.

< Installation >

(1) Perform the above steps in reverse order when reassembling.
(2) The terminal of the FG coil assembly is of one touch type and is locked into the receptacle rectangular opening on the main base. Fix the terminal securely by pushing it as far as possible.
(Confirm that the FG coil is not separated from the capstan sleeve.)
(3) When rethreading the capstan belt, position the belt with the mark faced outside and matched to the travel direction.
(4) Perform adjustments so that capstan flywheel thrust clearance of 0.05 – 0.2 mm is obtained.
  a) Loosen the adjusting screw ⑩.
  b) Tighten the screw clockwise slowly with force of about approx. 1kg until it stops. Then return the screw by 90 degrees. (Refer to Fig. a)
  c) Apply screw lock adhesive on the screw.
(5) When mounting the capstan sleeve cap, do not place it up side down.
Insert the capstan sleeve cap on the capstan shaft and then press down until it touches the capstan sleeve lightly. (Do not apply excessive force.) (Refer to Fig. b)
(6) Clean following locations, using the cleaning kit.
  a) Inside of the capstan belt
  b) Outside surface of the capstan flywheel
  c) Motor pulley
  d) Capstan shaft (touching a tape)

Note: Magnetic particles sticking on the capstan flywheel assembly and the FG coil assembly may cause undesirable interference, take care to clean them off.

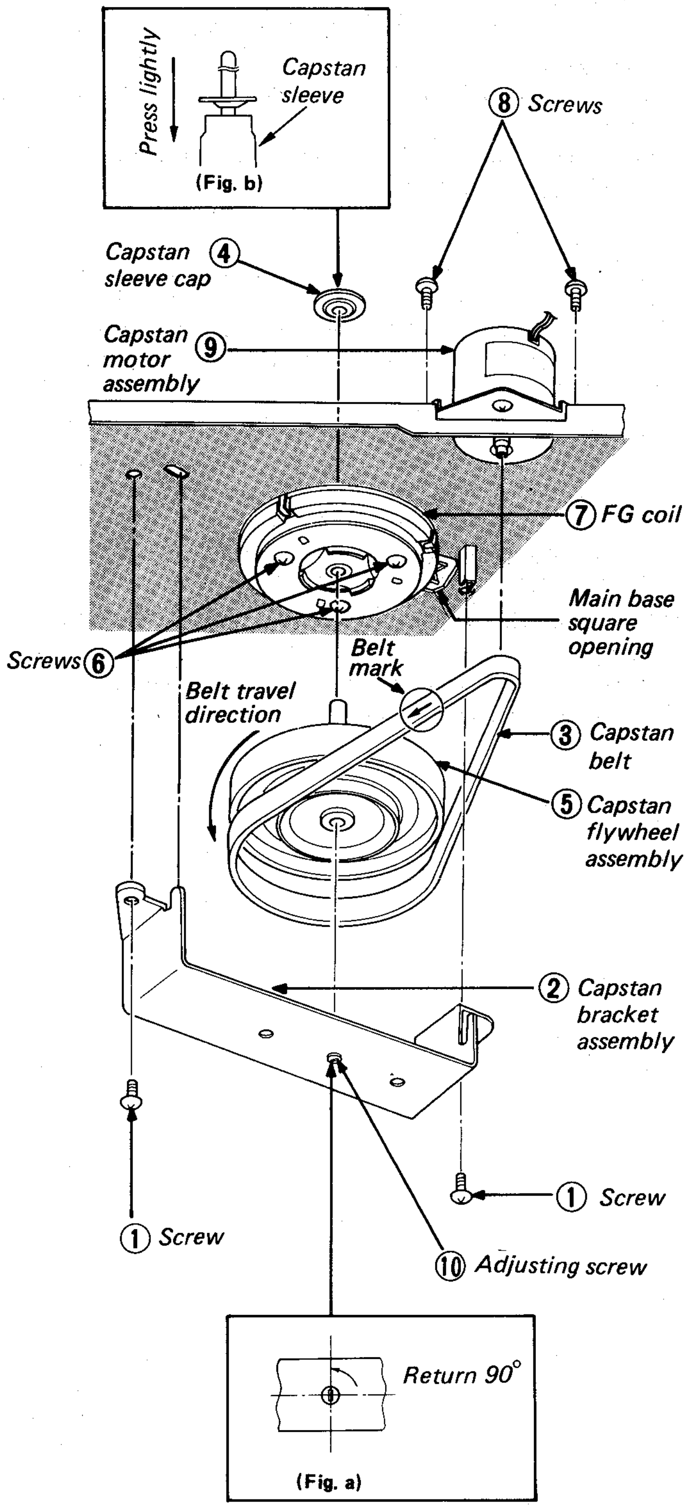

Press lightly
Capstan sleeve
(Fig. b)
⑧ Screws
Capstan sleeve cap ④
Capstan motor assembly ⑨
⑦ FG coil
Main base square opening
Screws ⑥
Belt mark
Belt travel direction
③ Capstan belt
⑤ Capstan flywheel assembly
② Capstan bracket assembly
① Screw
① Screw
⑩ Adjusting screw
Return 90°
(Fig. a)

Fig. 1-3-41 Capstan motor replacement

1-4. Check and Adjustment

1-4-1 Timing Check

(1) Cam gear and phase gear

1) Make sure through the C-hole on the main base that the holes on the cam gear and the loading drive base are coincided.
   If not, rotate the gear pulley assembly of the loading drive fully in the direction shown by the arrow to set FF mode. (Refer to Fig. 1-3-27)
2) Confirm the arrow mark of the phase gear is also coincided with the V-slot. If not coincided, adjust the timing by remounting the phase gear.

(2) Loading ring and loading drive gear

1) Make sure through the main base hole that holes of the S-loading ring and the T-loading ring are overlapped as shown by the arrow A. If they are not overlapped, adjust the location by removing the loading ring gear B.
2) Also make sure that the B-hole on the S-loading ring is coincided with the delta mark on the loading drive gear under the condition in the step 1) above. If they are not coincided, adjust the timing (location) by remounting the loading drive gear.
   (When remounting the loading drive gear, make sure one end of the bias spring is hooked on the main base cutout and the other end is hooked on the boss of the loading drive gear.)

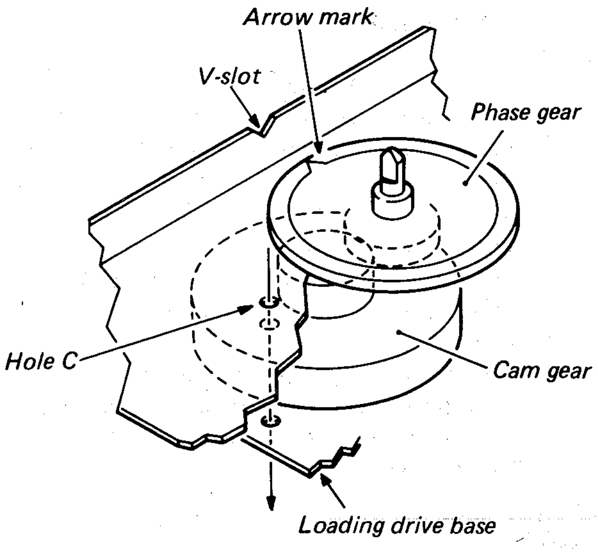

Arrow mark
V-slot
Phase gear
Hole C
Cam gear
Loading drive base

Fig. 1-4-1 Cam gear/phase gear

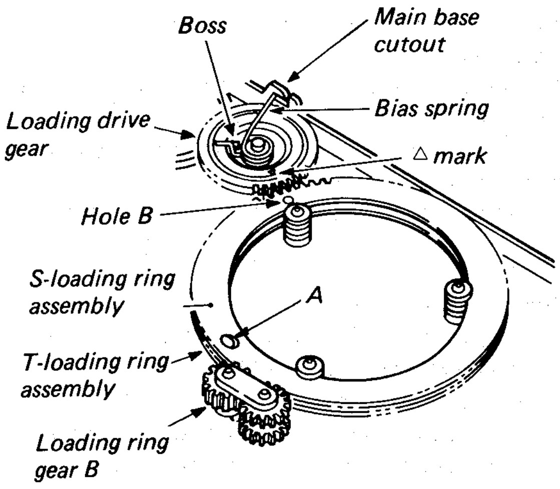

Boss
Main base cutout
Bias spring
Loading drive gear
△ mark
Hole B
S-loading ring assembly
A
T-loading ring assembly
Loading ring gear B

Fig. 1-4-2 Loading ring assembly/loading drive gear

1-4-2 Check and Adjustment of Tension Pole Position

(1) Set the deck to play mode with the front loading assembly removed.

(2) Make sure the center of the tension pole is in alignment with the left edge of No. 1 guide post (±1mm) as illustrated.

(3) If necessary, loosen the screw ① and adjust the mounting position of the band bracket.

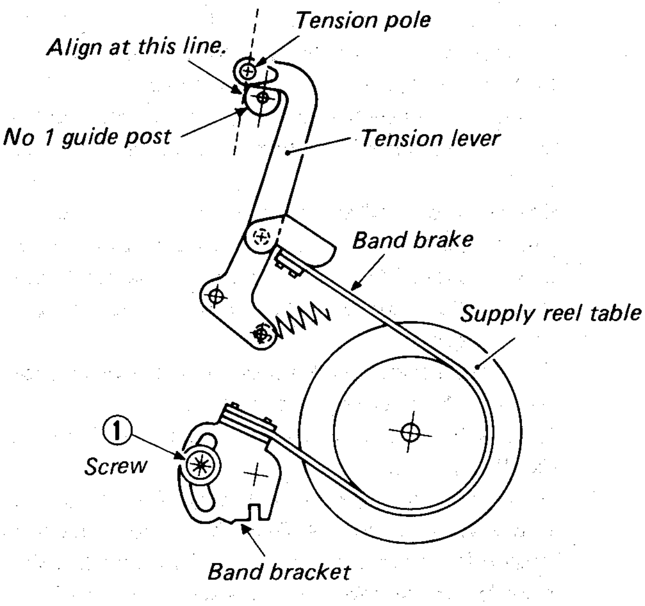

Tension pole
Align at this line.
No 1 guide post
Tension lever
Band brake
Supply reel table
①
Screw
Band bracket

Fig. 1-4-3 Tension pole position

1-4-3 Reel Torque

(1) Reel torque

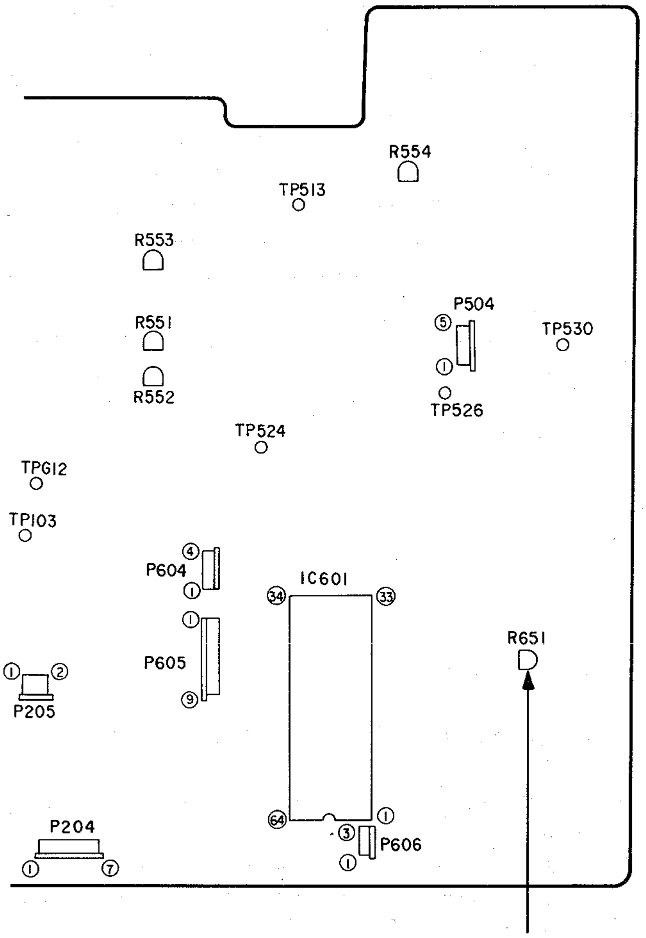
1) Record/Playback (take up side) mode
   Too little torque does not rewind the tape to the end. If too large, the tape may face the risk of being extended under extraordinary tension.
2) FF mode (take up side)
   REW mode (supply side)
   Too little torque does not rewind the tape to the end or takes too much time for rewinding.
4) Inspection
   Rewind the torque cassette up to the end, then check the torque shows the figure as shown below.
   Record/Playback 70 – 90g-cm
   FF/REW over 600g-cm

NOTE:

- If the reel torques are out of limits, clean the rubber surface of the idler assembly, the reel motor pulley, the reel table assembly, etc.
- Replace the idler assembly, if its rubber is hardened or worn out.
- Replace the brake pad of the main brake, if it is worn out.
- If the specified torque value is not obtained, replace the reel idler assembly.

(2) Reel torque adjustment

1) First, record a TV broadcast program on entire torque cassette tape (KT-300NR).
2) Set the VTR to the PLAY mode.
   Push the STILL/PAUSE button as soon as the play mode has been set. Wait several seconds and then set the VTR to the PLAY mode again.
   Read the right torque meter and adjust R651 so that the PLAY take-up torque of 80 ± 10 g-cm is obtained. If above value is not obtained, replace the reel motor assembly or idler assembly. (Refer to item 1-3-12, and Figs. 1-3-36 through 1-3-40)
3) When the reel motor assembly or the idler assembly was replaced, confirm and adjust the reel torque.
4) Confirmation and adjustment of the back tension will be performed with the front loading mechanism removed from the set and terminals 4 and 9 of P605 short-circuited, using a back tension cassette gauge.
   First, make sure that the tension pole is positioned correctly by referring to item 1-4-2.
   Load a back tension cassette and set the VTR to the PLAY mode.
   Make sure the meter is indicating 16 – 26 gf-cm. If the value is out of limit, first make sure the tension lever spring is normal, and then replace the band brake assembly as required. (Refer to item 1-3-6)



Reel torque adjustment

Main PC Board

PRECAUTIONS FOR USE OF TORQUE CASSETTE (KT-300NR)

1. Before loading a torque cassette in a VTR, always remove tape slack. The tape slack will be removed by rotating the reel in its take-up direction. (Particularily, the torque cassette is prone to be slacken because of no reel brake provided.)
2. When the torque cassette is slotted in, confirm the following:
   a) Tape does not run on to No. 8 cap or exceeds the cap. If the tape runs on or exceeds the cap, do not eject the tape but bring the tape to its correct position, taking care not to damage the tape.
   b) Make sure the tape is not slackened, if slackened, operate the VTR in FF or REW mode and then stop the tape. Then make sure the tape is not slackened again.
   c) After above confirmation, proceed to adjustments and confirmation.
3. Cautions for removal of torque cassette
   a) When removing the torque cassette from the VTR, set the VTR to the STOP mode and wait for several seconds. Then, make sure the tape is not slackened. Push the EJECT button to remove the cassette.
   b) When removing the torque cassette from the VTR, also make sure the tape is not slackened inside the cassette lid before pulling the cassette from the VTR. If the tape is slackened inside the lid, carefully bring the tape in place and then pull the cassette.
4. Cautions for playback operation
   a) When making adjustments and confirmation in the PLAY mode, first push the PLAY key, and then push STILL/PAUSE key to set the STILL mode. Run the VTR for several seconds in the STILL mode. Release the STILL mode and set the PLAY mode.
      Then, perform the adjustments and confirmation works.
5. If above precautions 1, 2, 3 and 4 are not performed properly, the tape may be damaged and correct measurement can not be performed.
6. Do not use worn out or damaged tape, if used they may damage video heads on the cylinder. In such a case always replace the tape with new one.
   The replacement tape is of E-120 type, 6.01m ± 0.3m in length.

1-4-4 Tape Transport System

The tape transport system has been precisely adjusted in the factory, so no check and alignment are necessary except the followings:

- Noises observed on the screen
- Tape damage
- Parts, shown in the adjustment procedures for the tape transport system, item 1-3-3, were replaced.

< Adjustment reference >

Lower flange height of No. 8 guide is used as the basic reference for the transport adjustment, so do not move the No. 8 guide except replacing the No. 8 guide sleeve. When the adjustment is needed, perform the adjustment with extreme care, using the height adjustment jig. Refer to item 1-3-3 (2).

(1) Location of tape transport adjustment

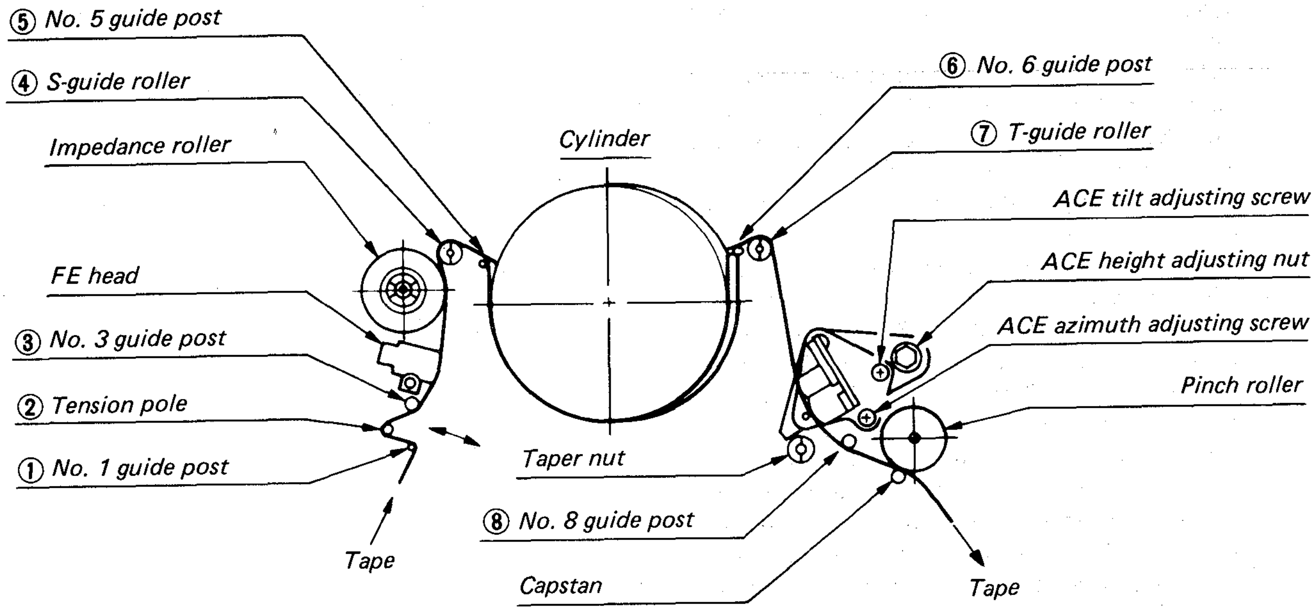

⑤ No. 5 guide post
④ S-guide roller
Impedance roller
FE head
③ No. 3 guide post
② Tension pole
① No. 1 guide post
Tape
Cylinder
Taper nut
⑧ No. 8 guide post
Capstan
⑥ No. 6 guide post
⑦ T-guide roller
ACE tilt adjusting screw
ACE height adjusting nut
ACE azimuth adjusting screw
Pinch roller
Tape

Fig. 1-4-4 Locations of tape transport adjustment

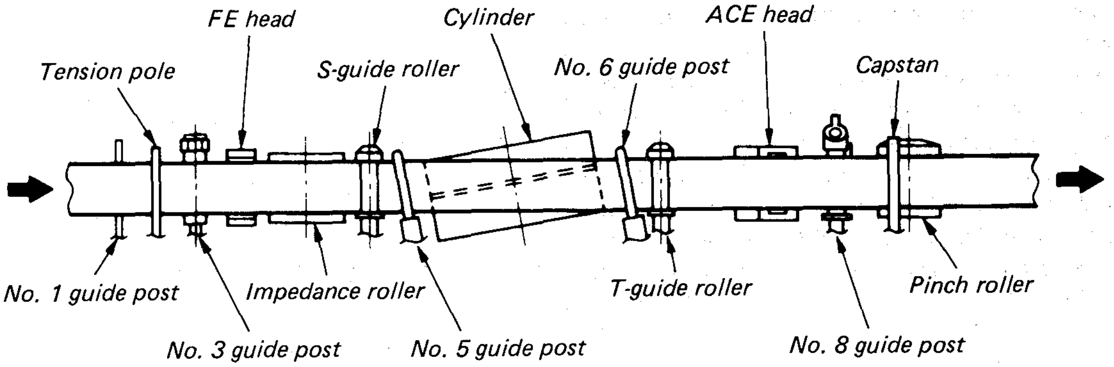
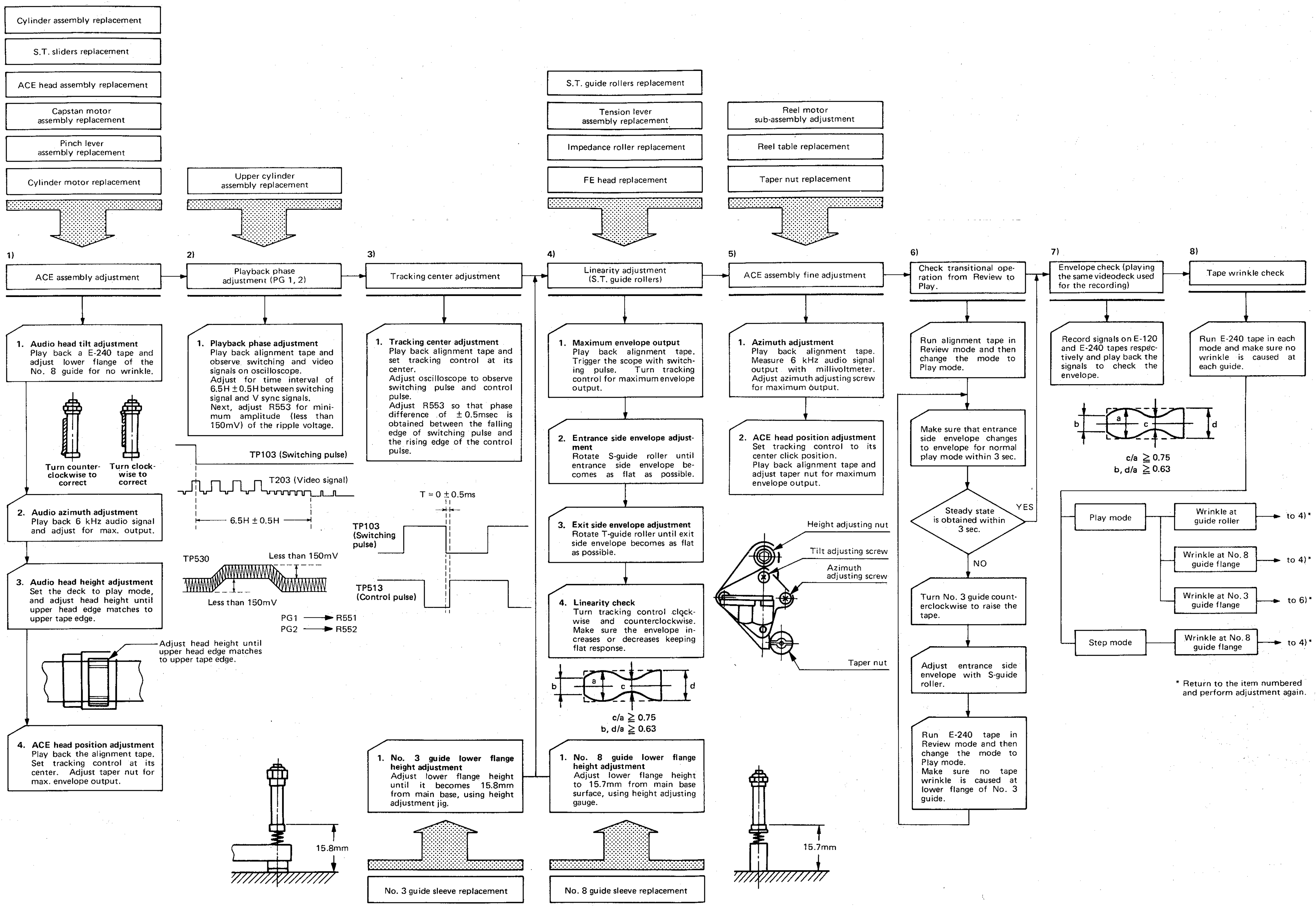

FE head
Cylinder
ACE head
Tension pole
S-guide roller
No. 6 guide post
Capstan
No. 1 guide post
Impedance roller
T-guide roller
Pinch roller
No. 3 guide post
No. 5 guide post
No. 8 guide post

Fig. 1-4-5 Tape travel diagram

(2) Tape transport system adjustment flow chart



Cylinder assembly replacement

S.T. sliders replacement

ACE head assembly replacement

Capstan motor assembly replacement

Pinch lever assembly replacement

Cylinder motor replacement

1) ACE assembly adjustment

1. Audio head tilt adjustment
Play back a E-240 tape and adjust lower flange of the No. 8 guide for no wrinkle.

2. Audio azimuth adjustment
Play back 6 kHz audio signal and adjust for max. output.

3. Audio head height adjustment
Set the deck to play mode, and adjust head height until upper head edge matches to upper tape edge.

Adjust head height until upper head edge matches to upper tape edge.

4. ACE head position adjustment
Play back the alignment tape. Set tracking control at its center. Adjust taper nut for max. envelope output.

Upper cylinder assembly replacement

2) Playback phase adjustment (PG 1, 2)

1. Playback phase adjustment
Play back alignment tape and observe switching and video signals on oscilloscope.
Adjust for time interval of 6.5H ± 0.5H between switching signal and V sync signals.
Next, adjust R553 for minimum amplitude (less than 150mV) of the ripple voltage.

PG1 → R551
PG2 → R552

3) Tracking center adjustment

1. Tracking center adjustment
Play back alignment tape and set tracking control at its center.
Adjust oscilloscope to observe switching pulse and control pulse.
Adjust R553 so that phase difference of ± 0.5msec is obtained between the falling edge of switching pulse and the rising edge of the control pulse.

1. No. 3 guide lower flange height adjustment
Adjust lower flange height until it becomes 15.8mm from main base, using height adjustment jig.

No. 3 guide sleeve replacement

S.T. guide rollers replacement

Tension lever assembly replacement

Impedance roller replacement

FE head replacement

4) Linearity adjustment (S.T. guide rollers)

1. Maximum envelope output
Play back alignment tape. Trigger the scope with switching pulse. Turn tracking control for maximum envelope output.

2. Entrance side envelope adjustment
Rotate S-guide roller until entrance side envelope becomes as flat as possible.

3. Exit side envelope adjustment
Rotate T-guide roller until exit side envelope becomes as flat as possible.

4. Linearity check
Turn tracking control clockwise and counterclockwise. Make sure the envelope increases or decreases keeping flat response.

c/a ≧ 0.75
b, d/a ≧ 0.63

1. No. 8 guide lower flange height adjustment
Adjust lower flange height to 15.7mm from main base surface, using height adjusting gauge.

No. 8 guide sleeve replacement

Reel motor sub-assembly adjustment

Reel table replacement

Taper nut replacement

5) ACE assembly fine adjustment

1. Azimuth adjustment
Play back alignment tape. Measure 6 kHz audio signal output with millivoltmeter. Adjust azimuth adjusting screw for maximum output.

2. ACE head position adjustment
Set tracking control to its center click position.
Play back alignment tape and adjust taper nut for maximum envelope output.

6) Check transitional operation from Review to Play.

Run alignment tape in Review mode and then change the mode to Play mode.

Make sure that entrance side envelope changes to envelope for normal play mode within 3 sec.

Steady state is obtained within 3 sec.

Turn No. 3 guide counterclockwise to raise the tape.

Adjust entrance side envelope with S-guide roller.

Run E-240 tape in Review mode and then change the mode to Play mode.
Make sure no tape wrinkle is caused at lower flange of No. 3 guide.

7) Envelope check (playing the same videodeck used for the recording)

Record signals on E-120 and E-240 tapes respectively and play back the signals to check the envelope.

c/a ≧ 0.75
b, d/a ≧ 0.63

8) Tape wrinkle check

Run E-240 tape in each mode and make sure no wrinkle is caused at each guide.

Play mode	Wrinkle at guide roller	to 4)*
	Wrinkle at No. 8 guide flange	to 4)*
	Wrinkle at No. 3 guide flange	to 6)*
Step mode	Wrinkle at No. 8 guide flange	to 4)*

* Return to the item numbered and perform adjustment again.

(3) Tape transport system adjustment

- **Pre-adjustment**

When the part(s) listed in table 1-4-1 is replaced, perform required adjustments by referring to procedures for the tape transport system.

When the part(s) listed in table 1-4-1 is replaced, the tape path may be changed and may damage alignment tape. To prevent this, first run a E-240 tape and make sure excessive tape wrinkle does not occur at each tape guide.

1) If tape wrinkle is observed at the No. 3 and the No. 8 guides, make sure of the preset height of these guides again.
2) If tape wrinkle is observed at the S, T-guide rollers, turn the S, T-guide rollers for no wrinkle.

- **Adjustment procedures**

1) ACE head assembly adjustment

a. ACE tilt adjustment

a.1) Play back a E-240 tape and observe running condition of the tape at the lower flange of No. 8 guide.

a.2) Adjust the ACE tilt adjusting screw until tape wrinkle is caused at the lower flange of No. 8 guide as shown in Fig. 1-4-7(a).

a.3) Turn the ACE tilt adjusting screw counterclockwise until the tape travels along the lower flange as shown in Fig. 1-4-7(b).

b. Audio azimuth adjustment

b.1) Play back the alignment tape MH-2, 6 kHz portion of audio signals.

b.2) Connect a millivoltmeter to the audio line output terminal.

b.3) Turn the ACE azimuth adjusting screw to obtain maximum audio output.

Table 1-4-1

Part replacement	Adjustment procedure
● Cylinder complete assembly ● S, T Sliders ● ACE head assembly ● Capstan motor assembly ● Pinch lever assembly ● Cylinder motor	From item 1)
● Upper cylinder	From item 2)
● S, T guide rollers ● Tension lever assembly ● Impedance roller ● FE head ● No. 3 guide sleeve ● No. 8 guide sleeve	From item 4)
● Reel motor sub-assembly ● Reel table (S, T) ● Taper nut	From item 5)

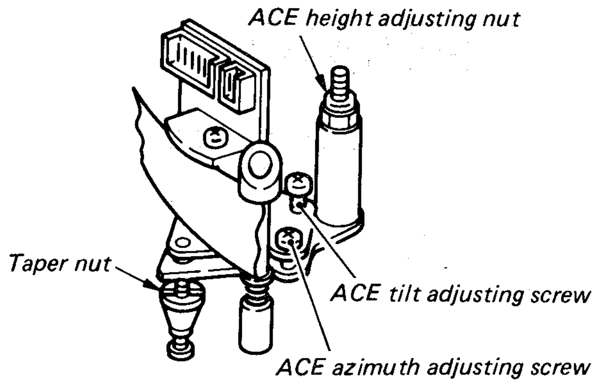


Fig. 1-4-6 ACE head assembly

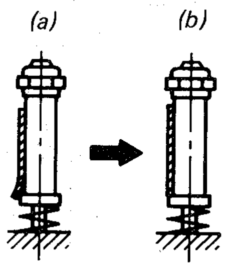


Fig. 1-4-7 No. 8 guide check

c. Audio head height adjustment

c.1) Run the alignment tape (MH-2) in the play back mode.

c.2) Observe surface of the audio head using a dental mirror.

c.3) White ceramic is provided on both sides of the audio and control heads of the ACE head assembly.

Turn the ACE height adjusting nut so that upper tape edge matches to the lower edge of the ceramic on the upper audio head.

If the above method is defficient, play back the 1 kHz portion of the alignment tape (MH-2) and adjust for maximum audio output.

d. ACE head position pre-adjustment

> **Note:** Before proceeding with this adjustment, remove adhesive cement applied on the taper nut.

d.1) Play back the alignment tape (MH-2).

d.2) Adjust the taper nut for maximum envelope output after the tracking control set at its center position.

2) Playback phase adjustment (PG1, PG2 adjustment)

a. Play back the alignment tape (MH-2).

b. Observe a video signal on an oscilloscope display triggered with the switching pulse.

c. Adjust R551 for time interval of 6.5 ± 0.5H between switching signal and V sync pulse. (Fig. 1-4-9 (a))

d. Next, adjust R552 for minimum amplitude (less than 150mV) of the ripple voltage observed at TP530. (Fig. 1-4-9(b))

3) Tracking center adjustment (Subtracking)

a. Play back the alignment tape (MH-2).

b. Adjust R553 so that phase difference of 0 ±0.5 msec is obtained between the falling edge of the switching pulse and the rising edge of the control pulse. (Fig. 1-4-10)

> **Note:** In this case, adjust the tracking control at the click position.

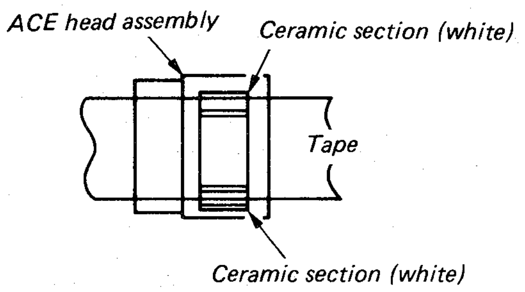


Fig. 1-4-8 Head height

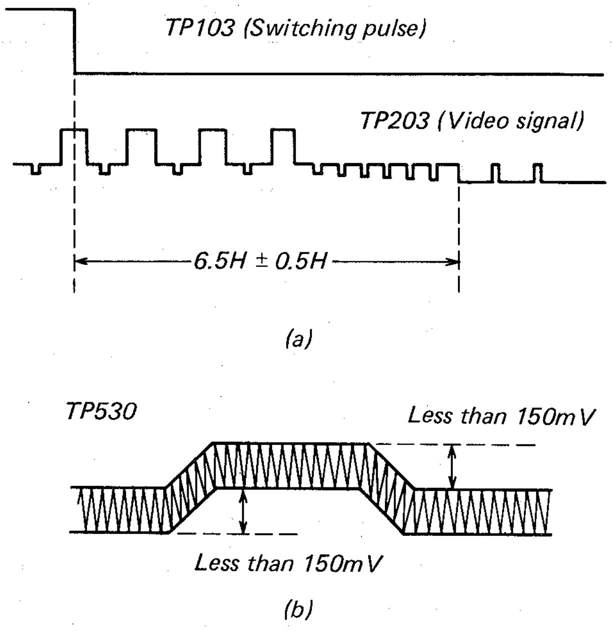


Fig. 1-4-9 Playback phase adjustment

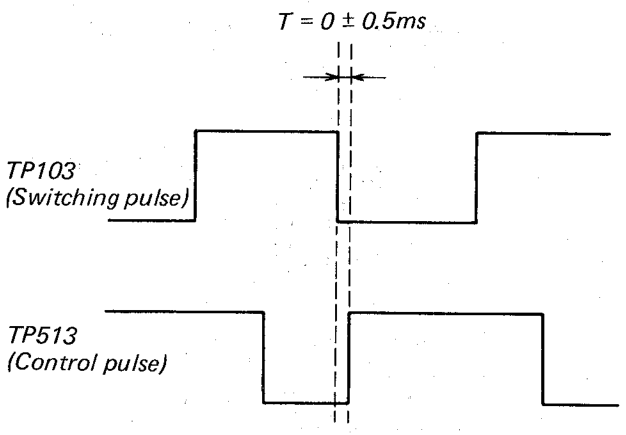


Fig. 1-4-10 Tracking center adjustment

4) Linearity adjustment (S, T guide rollers adjustment)

a. Play back a stair step signal on the alignment tape (MH-2).

b. Observe the signal envelope on an oscilloscope display triggered by the switching pulse.

c. Make sure the envelope waveform (in its maximum output) meets the specification shown in Fig. 1-4-11. If not, adjust as follows:

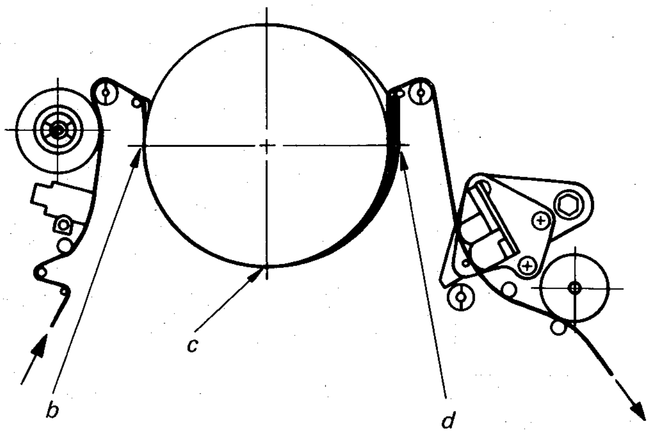
Note:
a = maximum output of the envelope
b = minimum output of the envelope at the entrance side
c = minimum output of the envelope at the center point
d = minimum output of the envelope at the exit side

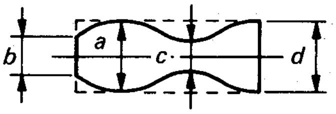
d. If the A section in Fig. 1-4-12 does not meet the specification, adjust the S-guide roller in up or down direction.

e. If the B section in Fig. 1-4-12 does not meet the specification, adjust T-guide roller in up or down direction.

f. After completion of the adjustment(s), turn the tracking control and make sure the envelope varies almost flat.

g. If the envelope varies as shown in Fig. 1-4-13, adjustment of the S, T-guide rollers may be upset, and perform the adjustment again.





c/a ≧ 0.75 : b, d/a ≧ 0.63

Fig. 1-4-11 Envelope waveform specification

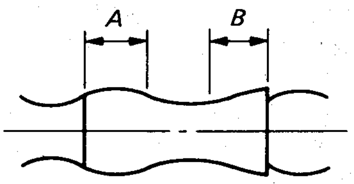


Fig. 1-4-12 Adjustment points

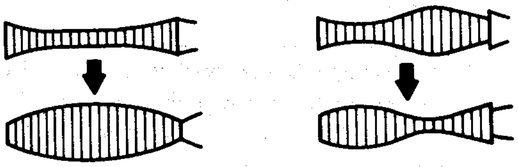


Fig. 1-4-13 Abnormal variation of the waveform

5) ACE head assembly adjustment

a. Tape wrinkle check at the lower flange of No. 8 guide.

a.1) If tape wrinkle is observed at the lower flange of No. 8 guide, adjust the ACE tilt adjusting screw counterclockwise as shown in Fig. 1-4-6 until the wrinkle disappears.

a.2) If a gap is observed between the lower flange of No. 8 guide and the lower edge of tape, adjust the ACE tilt adjusting screw clockwise until the tape travels along the lower flange.

> **Note:** This adjustment should be made using a beginning part of E-240 tape.

b. Azimuth adjustment

b.1) Play back the 6 kHz audio signal on the alignment tape (MH-2).

b.2) Adjust the ACE azimuth adjusting screw for maximum audio output as shown in Fig. 1-4-6.

c. ACE head position adjustment

c.1) Play back the stair step signal on the alignment tape (MH-2).

c.2) Place the tracking control at its center click position.

c.3) Trigger an oscilloscope with the switching pulse and observe the envelope waveform of CH-2 output.

c.4) Turn the taper nut counterclockwise until the ACE base reaches the lower taper end of the taper nut as shown in Fig. 1-4-14.

c.5) Turn the taper nut slowly counterclockwise and fix the taper nut at the position where the envelope reaches a first peak level.

c.6) Play back the stair step signal on the alignment tape (MH-2).

c.7) Make sure the envelope is maximum with the tracking control set to the center click position.

> **Note:** If no envelope is observed with the tracking control set to the center position, perform the envelope adjustment to obtain maximum envelope, again.

c.8) Play back the stair step signal on the alignment tape (MH-2) and make sure the audio output is maximum.

> **Note:** After completion of the ACE head position adjustment, the ACE base must be positioned at approximately the center of the taper nut as shown in Fig. 1-4-15.

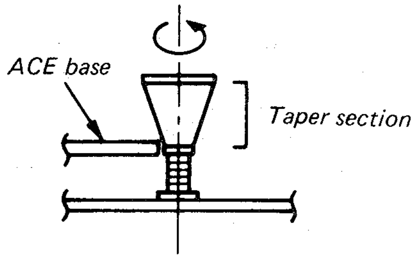


Fig. 1-4-14 Taper nut and ACE base

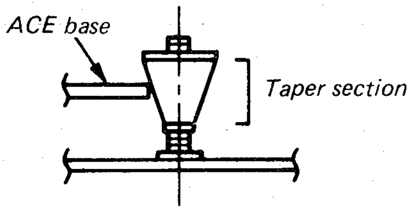


Fig. 1-4-15 Position of taper nut after adjustment

6) Check for transitional operation from Review to Play

a. Play back the alignment tape (MH-2) in Review mode and observe the envelope with an oscilloscope.

b. Switch the Review mode to the Play mode When switched to the Play mode, make sure the entrance side envelope becomes to an approximate steady state within 3 seconds as shown in Fig. 1-4-16.
If it does not rises within 3 seconds, adjust as follows:

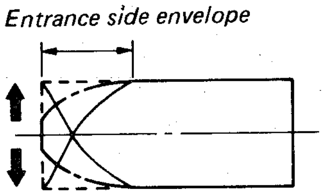


Fig. 1-4-16 Envelope rising when operation mode is switched from review to play mode

c. Turn the No. 3 guide nut counterclockwise to adjust the lower flange height as shown in Fig. 1-3-22.
Make sure the tape travels along the lower flange.

d. Play back a stair step signal. Since entrance side linearity varies as the height of No. 3 guide varies, adjust the S-guide roller to correct the linearity.

e. Change operation mode from the Review to the Play mode again and make sure the entrance side envelope rises within 3 seconds. If not, perform the adjustment again from the item c..

f. Play back the E-240 tape in the Play mode and make sure no tape wrinkle occurs at the lower flange of the No. 3 guide.
If the tape is raised too high at the No. 3 guide, the tape will be damaged. So if tape wrinkle occurs, turn the No. 3 guide nut clockwise until the wrinkle disappears and then perform adjustment from the item d.

> **Note:** If the rising characteristic is poor in Review mode, screen noises may occur in synchronous editing recording.
> Perform the adjustment carefully.

7) Envelope check

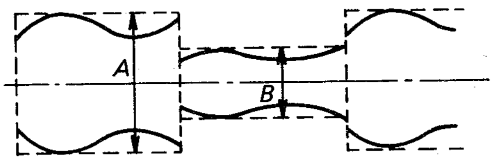
a. Make recordings on E-120 and E-240 tapes and make sure the playback output envelope meets the specification shown in Fig. 1-4-11.

b. In playing the same video deck used for the recording using the E-120 the envelope should meet the specification shown in Fig. 1-4-17.

c. If the performance does not meet both specifications a. and b., replace the upper cylinder assembly.

d. Confirm operation of the synchronous editing, using a beginning portion of a E-120 tape.

e. If picture noises are observed at the starting position of the editing, adjust the preset height of the No. 3 guide again. (Fig. 1-3-19)



- $B/A \geqq 0.55$
- $B \geqq 120mV$

Fig. 1-4-17 Envelope output and output level difference

8) Tape wrinkle check

a. Play back the E-240 tape in the playback, Cue, Review and the frame feeding mode, and observe tape wrinkle at each guide.

b. If excessive tape wrinkle is observed at the mode shown below, perform the associated adjustments also shown below.

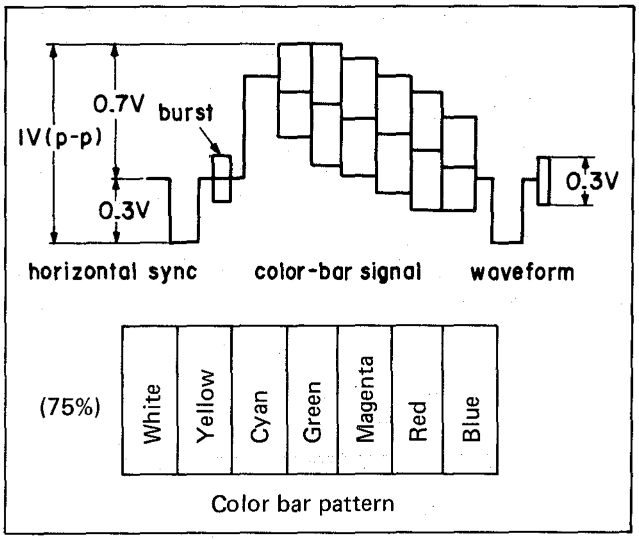
b.1) Play back mode
  Tape wrinkle at the S, T-guide roller section
    Item 4: Linearity adjustment
  Tape wrinkle at No. 8 guide flange
    Item 4: Linearity adjustment
  Tape wrinkle at No. 3 guide flange
    Item 6: Rising characteristic check in mode change from Review to Play mode.

b.2) Frame feeding mode
  Tape wrinkle at No. 8 guide
    Item 4: Linearity adjustment

2. ELECTRICAL ADJUSTMENT

< Test equipments required >

(1) Color TV (Monitor)
(2) Oscilloscope, 2 CHs, 15 MHz or higher with delay system
(3) Frequency counter (7 digits or higher)
(4) Millivoltmeter
(5) Digital voltmeter
(6) Multimeter (20K ohm/V)
(7) Audio generator
(8) Audio attenuator
(9) Alignment tapes
Part code: MH-2: 70909094
(10) Alignment screw driver (jig)
(11) Color pattern generator
(12) Video sweep generator



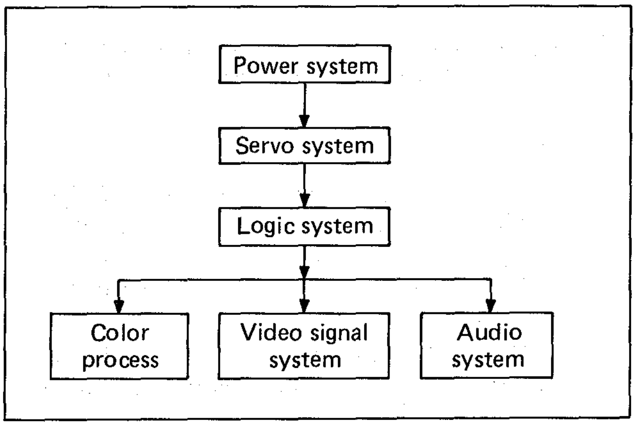
0.7V
burst
IV(p-p)
0.3V
0.3V
horizontal sync color-bar signal waveform
(75%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
Color bar pattern

Fig. 2-1-1

< Color bar signal >
Color bar signals of 75% recorded on the test tapes are shown in Fig. 2-1-1.

< Specified input and output levels, and impedance >
Video input: Negative sync, standard composite video signal 1Vp-p, 75 ohm
Video output: Same as the video input. 1Vp-p, 75 ohm
Audio input: –10 dBs, 50k ohm
Audio output: –7 dBs, less than 10k ohm

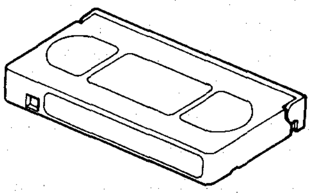
< Alignment sequence >
Proceed the alignments in the sequence as shown in Fig. 2-1-2.



Power system
Servo system
Logic system
Color process
Video signal system
Audio system

Fig. 2-1-2

Alignment tape specifications



Alignment tape MH-2

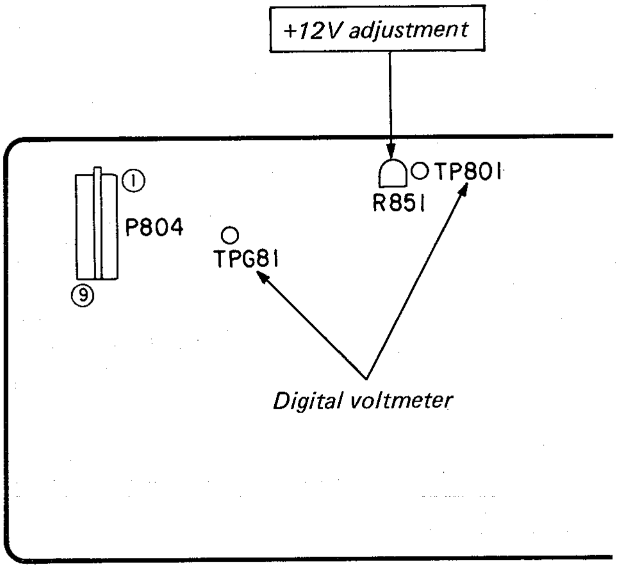
MH-2

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairstep	6 kHz	● Interchangeability check and adjustments. ● Servo circuit checks and adjustments. ● Audio head azimuth adjustments.
2	5 minutes	(none)	3 kHz	● Tape speed checks. ● Wow and flutter checks.
3	10 minutes	Color bar	1 kHz 0 dB	● Video signal playback circuit checks and adjustments. ● Audio signal playback circuit checks and adjustments.
4	3 minutes	RF sweep	(none)	● Video head resonance checks. Marker: 2 MHz, 4 MHz, 5 MHz.

2-1. Power Supply Circuit

2-1-1 +12V adjustment

(1) Connect the power plug to AC input rated voltage.
(2) Set the VTR to REC mode.
(3) Connect the digital voltmeter between TP801 (+12V) and TPG81 (GND).
(4) Adjust variable resistor R851 to obtain voltage reading of 12.0 ± 0.1V.

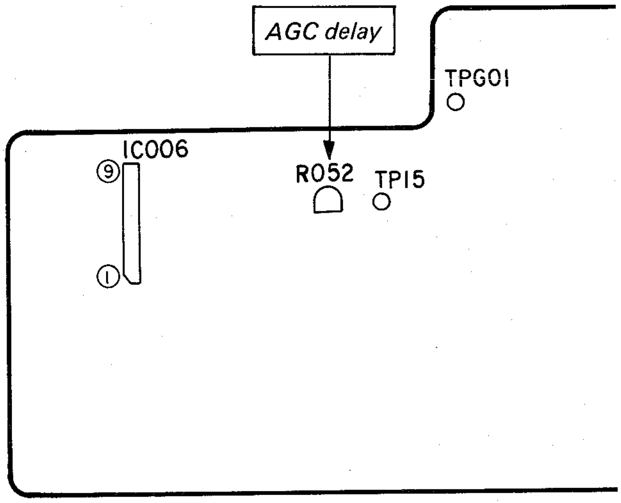

+12V adjustment
①
P804
⑨
TPG81
TP801
R851
Digital voltmeter

Power 1 PC Board

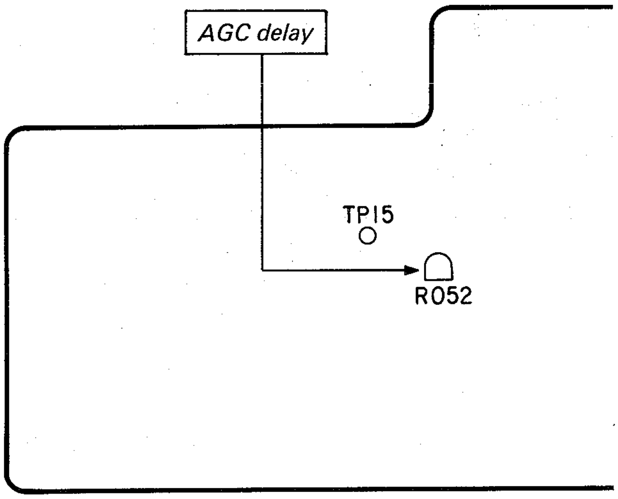
2-2. PIF Selector Circuit

2-2-1 AGC delay

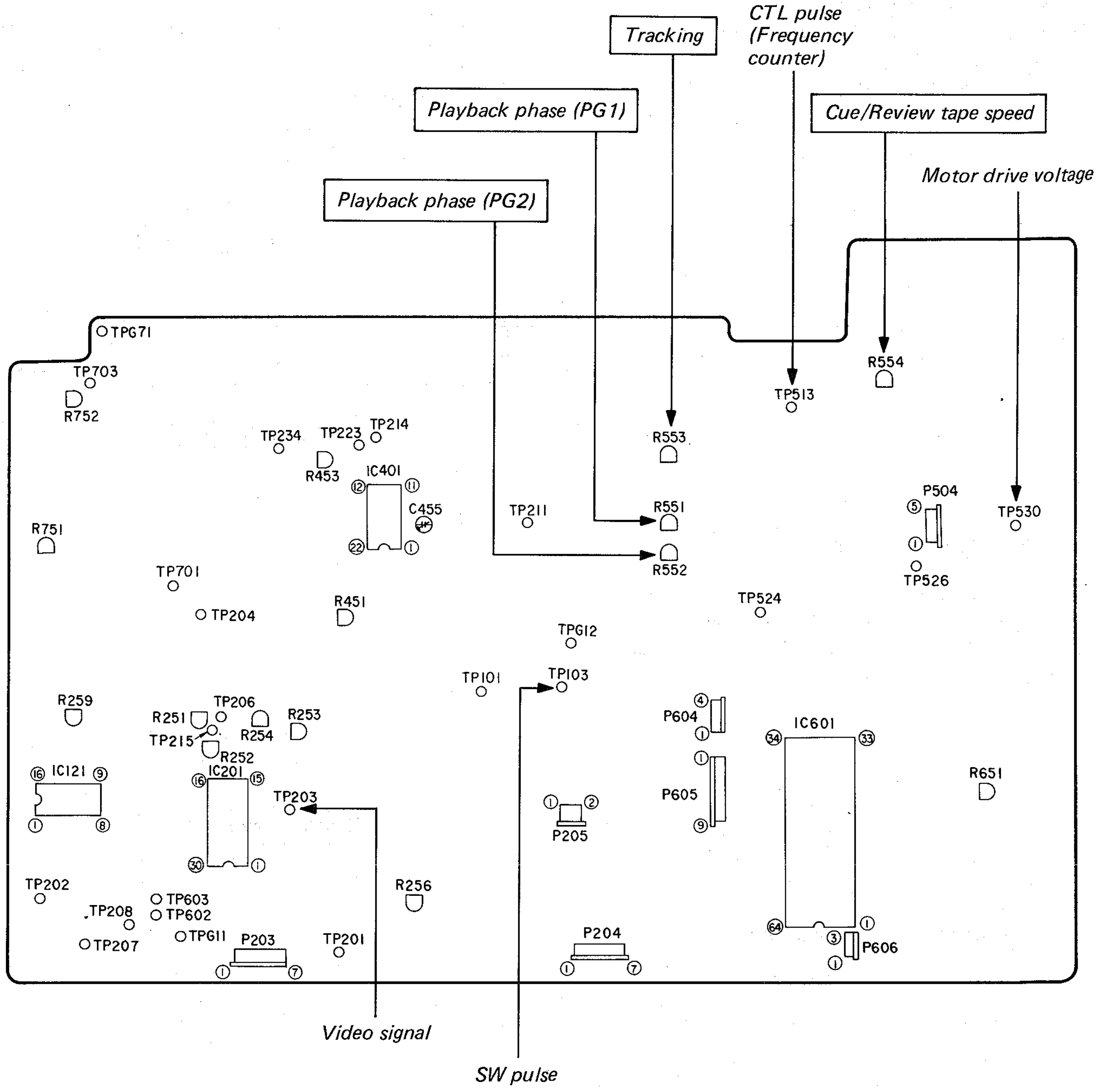
(1) Temporarily turn R052 fully clockwise.
(2) Turn R052 slowly counterclockwise for minimum noise and sound buzz.


AGC delay
TPG01
IC006
⑨
①
R052
TP15

PIF PC Board
(V-81/83G model)


AGC delay
TP15
R052

PIF PC Board
(V-81/83W model)


Tracking
CTL pulse (Frequency counter)
Playback phase (PG1)
Cue/Review tape speed
Motor drive voltage
Playback phase (PG2)
TPG71
TP703
R752
R554
TP513
TP234
TP223
TP214
R553
R453
IC401
C455
TP211
R551
P504
TP530
R751
TP701
R552
TP526
TP204
R451
TP524
TPG12
TP101
TP103
R259
TP206
R251
R253
R254
P604
IC601
TP215
R252
IC121
IC201
TP203
P605
R651
P205
TP202
R256
TP208
TP603
TP602
TP207
TPG11
P203
TP201
P204
P606
Video signal
SW pulse

Main (Video, Servo, Logic, Audio) PC Board

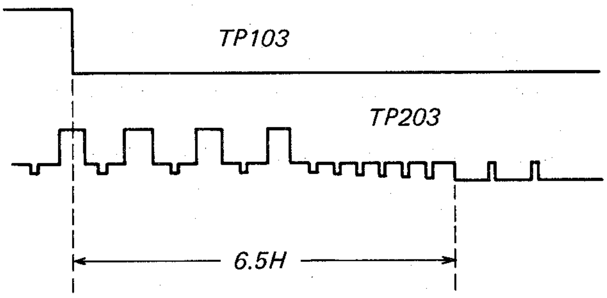
2-3. Servo Circuit

2-3-1 Playback phase (PG1)

(1) Playback the alignment tape (MH-2).
(Tracking control knob at its center click position)

(2) Set the oscilloscope to the chop mode, and externally trigger the scope with the SW pulse.
Connect the A-CH input to the SW pulse (TP103) and the B-CH to the video signal (TP203).

(3) Adjust R551 to position the falling edge of the SW pulse at 6.5H ± 0.5H from the V-sync front edge of the video signal.



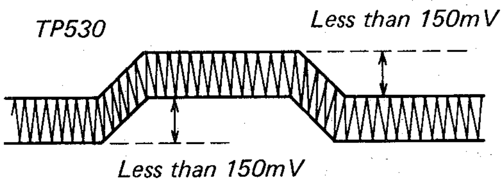
2-3-2 Playback phase (PG2)

(1) Always perform this adjustment after the adjustment 2-3-1 has been completed.

(2) Play back a recorded tape.

(3) Set the oscilloscope to the chop mode and connect the A-CH input to TP103 (SW pulse) and the B-CH to TP530 (cylinder motor drive voltage). Trigger the A-CH with the SW pulse.

(3) Adjust R552 for minimum voltage ripple (less than 150mV).



2-3-3 Tracking

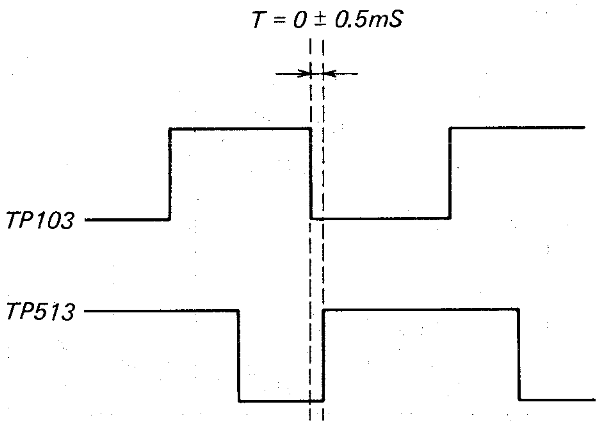
(1) Place the tracking control in the center click position.

(2) Play back a recorded tape.

(3) Set the oscilloscope to the chop mode.

(4) Connect the A-CH input to TP103 (SW pulse) and the B-CH to TP513 (CTL pulse). Trigger the oscilloscope with the SW pulse.

(5) Adjust R553 so that T becomes 0 ±0.5ms as illustrated.



2-3-4 Cue/Review tape speed

(1) Run a recorded tape in the cue mode.

(2) Connect a frequency counter to TP513 (CTL pulse).

(3) Adjust R554 until frequency reading of 179 Hz ±2 Hz is obtained.

(4) Set the VTR to the review mode and make sure that the frequency reading is 170 Hz ±4 Hz.

(5) If the frequency reading is out of limit, readjust R554 so that the frequency meets both specifications.

2-4. Video Circuit

2-4-1 4.43 MHz XO frequency

(1) Play back the alignment tape (color bar signal).

(2) Connect a frequency counter to TP211 and set the measurement range to a position which gives reading accuracy of 1 Hz.

(3) Adjust C455 trimmer until the frequency reading of 4.433619 MHz ±25 Hz is obtained.

2-4-2 VCO frequency

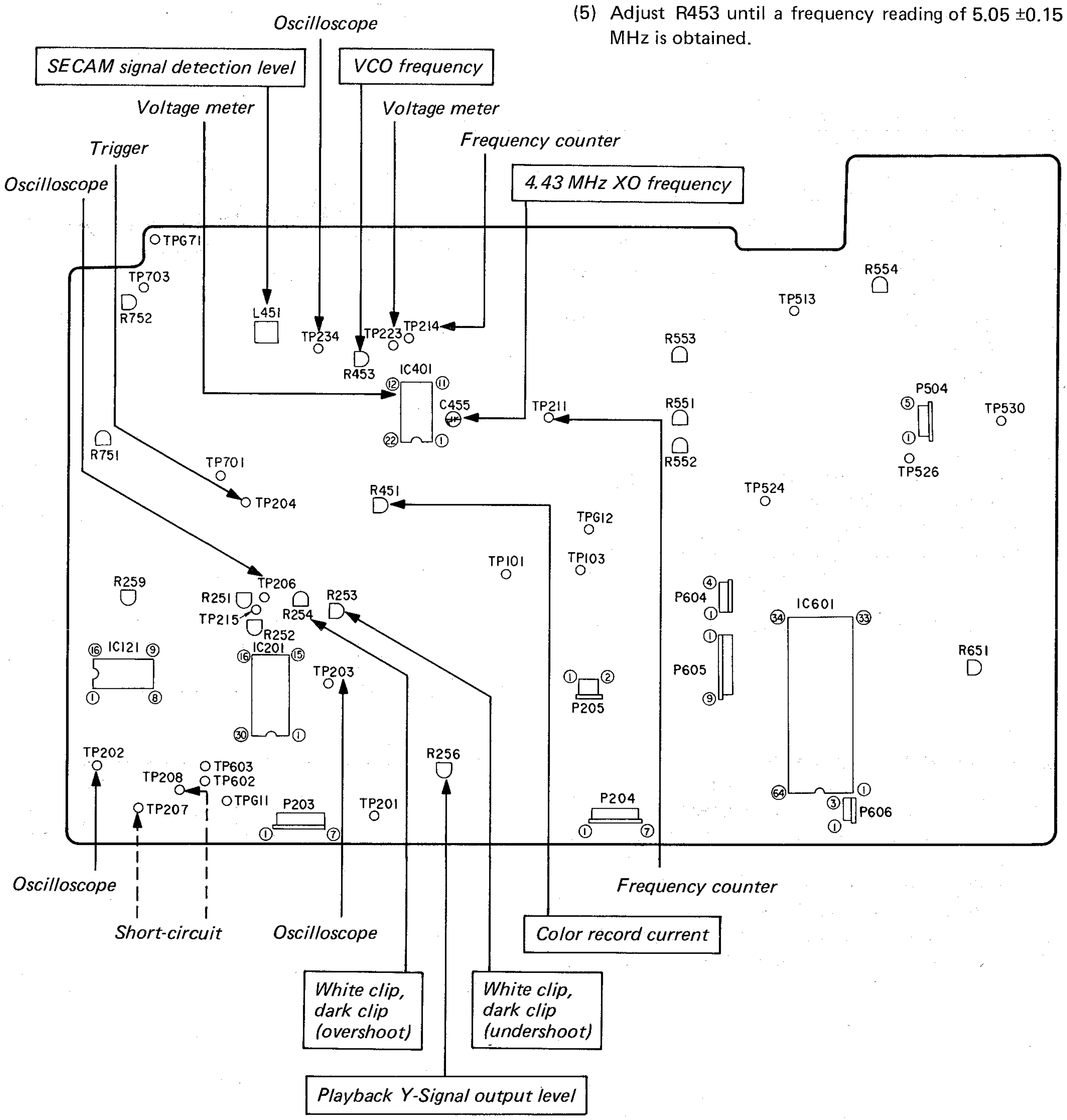
(1) Feed the color bar signal to the line input terminal. Do not push any operation buttons.

(2) Measure the voltage of 5V line. (Ev)

(3) Apply DC voltage of 1/2Ev ±0.02V to TP223 (pin ⑬ of IC401).

(4) Connect the frequency counter to TP214 and set the measurement range to a position that gives reading accuracy of 1kHz.

(5) Adjust R453 until a frequency reading of 5.05 ±0.15 MHz is obtained.

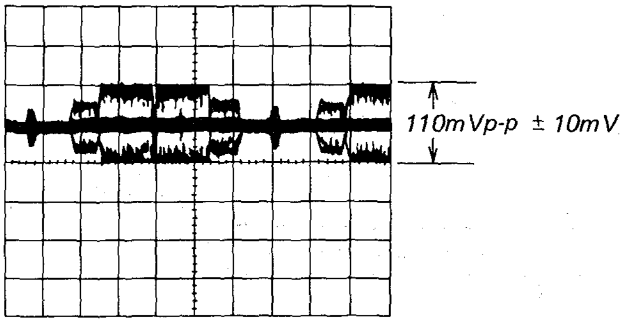


Oscilloscope
SECAM signal detection level
VCO frequency
Voltage meter
Voltage meter
Trigger
Frequency counter
Oscilloscope
4.43 MHz XO frequency
TPG71
TP703
R752
L451
TP234
TP223
TP214
R453
IC401
R553
R554
TP513
C455
TP211
R551
R552
P504
TP530
TP526
R751
TP701
TP204
R451
TP524
TPG12
TP101
TP103
R259
TP206
R251
R253
R254
TP215
R252
P604
IC601
IC121
IC201
TP203
P605
R651
P205
TP202
TP603
TP602
TP208
TPG11
P203
TP201
R256
P204
P606
TP207
Oscilloscope
Short-circuit
Oscilloscope
Frequency counter
Color record current
White clip, dark clip (overshoot)
White clip, dark clip (undershoot)
Playback Y-Signal output level

Main (Video, Servo, Logic, Audio) PC Board

2-4-3 Color record current

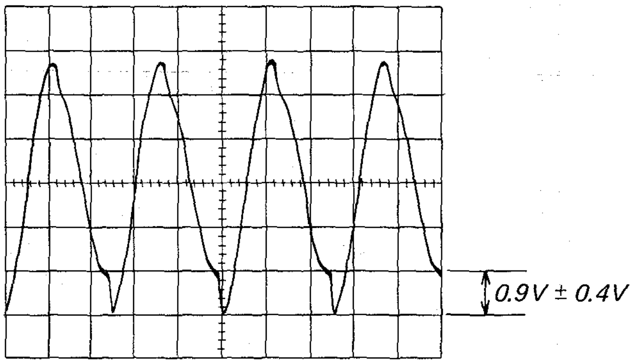
(1) Feed the color bar signal to the line input terminal, and set the VTR to the record mode.
(2) Connect the oscilloscope to TP202 and trigger the scope with a composite sync signal (TP204).
Adjust the oscilloscope so that it can display a waveform of approx. 2H.
(3) Short-circuit between TP207 and TP208.
(4) Adjust R451 to obtain a red signal amplitude of 110mVp-p ±10mV.



Horizontal axis: 10µs/div.
Vertical axis: 50mV/div.

2-4-4 SECAM signal detection level

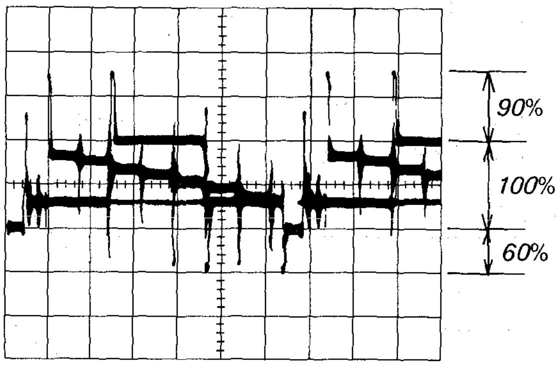
(1) Feed the SECAM color bar signal to the line input terminal and set the VTR to the record mode.
(2) Connect the oscilloscope to TP234.
(3) Adjust L451 to obtain a detection output waveform of 0.9 ±0.4V at the peak.



Horizontal axis: 50µs/div.
Vertical axis: 1V/div.

2-4-5 White clip, dark clip

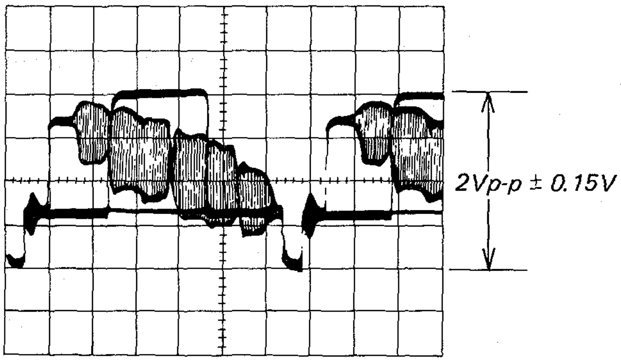
(1) Feed the color bar signal to the line input terminal. Do not push any operation buttons.
(2) Connect the oscilloscope to TP206 and trigger the scope with a composite sync signal at TP204.
Adjust the scope so that it can display a waveform of approx. 2H.
(3) Adjust R254 so that amplitude of overshoot appearing on the video signal side shows 90 ±5% of a Y signal amplitude of 100%.
(4) Adjust R253 so that an undershoot appearing on the sync tip side shows 60 ±5% of a Y signal amplitude of 100%.



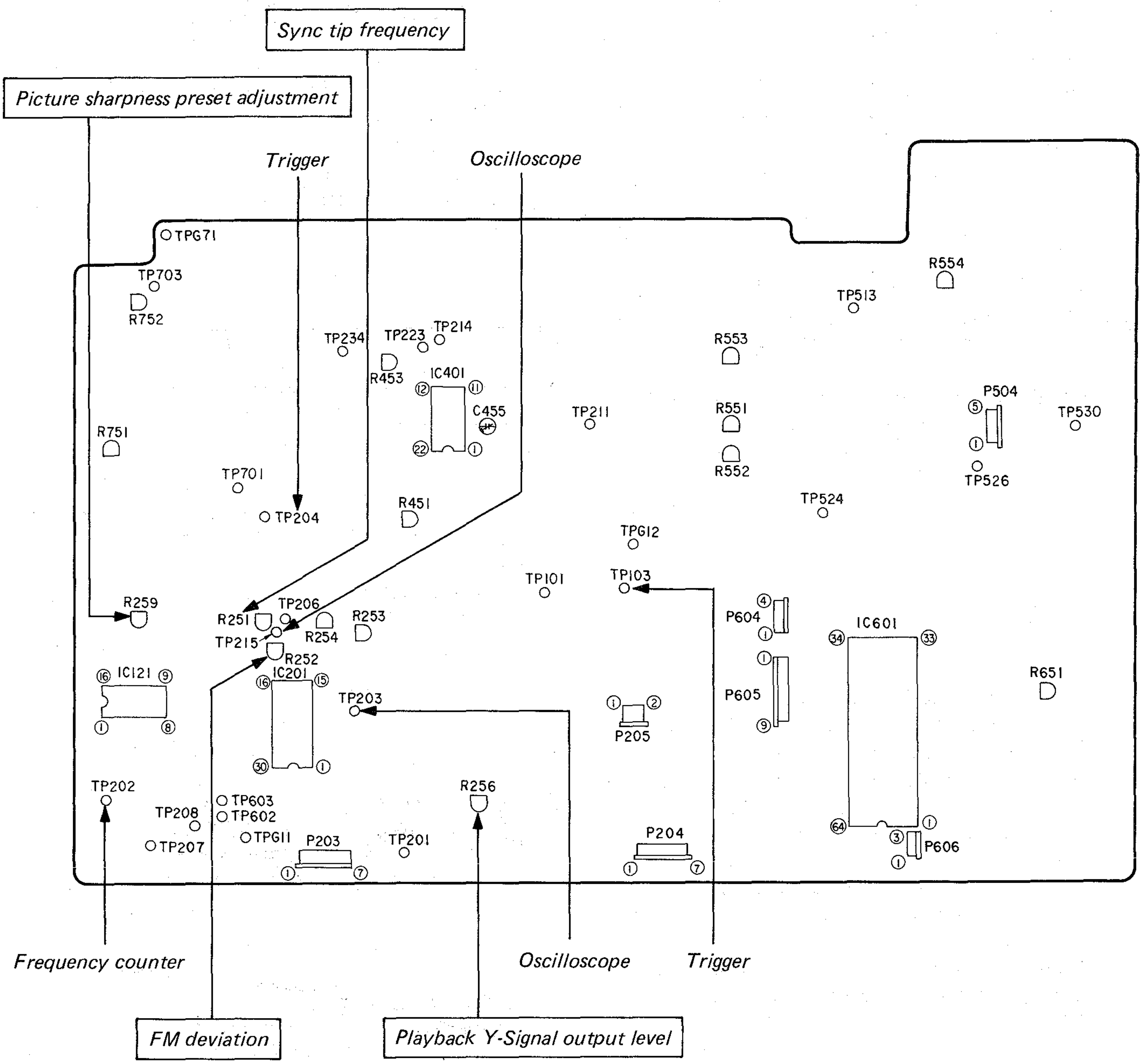
Horizontal axis: 10µs/div.
Vertical axis: Adjust as illustrated, using a calibrator.

2-4-6 Playback Y-Signal output level

(1) Play back the alignment tape (color bar signal).
(2) Connect the oscilloscope to TP203 and trigger the scope with a composite sync signal (TP204).
Adjust the scope so that it can display a waveform of approx. 2H.
(3) Adjust R256 to obtain 2.0 Vp-p ±0.15Vp-p between the sync tip and 100% white level.



Horizontal axis: 10µs/div.
Vertical axis: 0.5V/div.


Sync tip frequency
Picture sharpness preset adjustment
Trigger
Oscilloscope
TPG71
TP703
R752
R554
TP513
TP234
TP223
TP214
R553
R453
IC401
⑫
⑪
C455
TP211
R551
P504
⑤
TP530
R751
㉒
①
①
R552
TP526
TP701
TP204
R451
TP524
TPG12
TP101
TP103
R259
TP206
R251
R253
P604
④
①
IC601
㉞
㉝
TP215
R254
R252
IC201
⑯
⑮
R651
⑯
IC121
⑨
TP203
①
②
P605
⑨
①
⑧
P205
㉚
①
TP202
TP208
TP207
TP603
TP602
TPG11
P203
R256
TP201
P204
①
⑦
①
⑦
(64)
①
③
P606
①
Frequency counter
Oscilloscope
Trigger
FM deviation
Playback Y-Signal output level

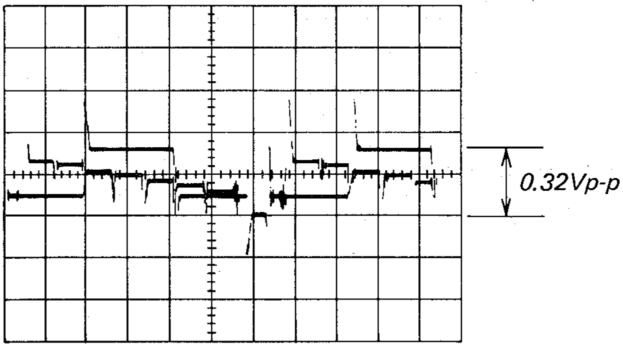
Main (Video, Servo, Logic, Audio) PC Board

2-4-7 FM deviation

(1) Feed the color bar signal to the line input terminal.

(2) Connect the oscilloscope to TP215 and trigger the scope with a composite sync signal at TP204. Adjust the scope to display a waveform of approx. 2H

(3) Adjust R252 to obtain the amplitude of approx. 0.32Vp-p between the sync tip and the white peak. After adjusting R256 (playback Y signal output level) with the method 2-4-5, repeat above the adjustment, and then adjust R252 (FM deviation control) so that the play back Y signal output level at TP203 shows 2.0Vp-p ±0.2Vp-p.



Horizontal axis: 10µs/div.
Vertical axis: 0.2mV/div.

2-4-8 Sync tip frequency

(1) Short circuit line input terminal to ground with phone jack and set the VTR to REC mode.

(2) Connect the frequency counter to TP202.

(3) Adjust R251 to obtain frequency of 3.90 MHz ±0.1 MHz.

2-4-9 Picture sharpness preset adjustment

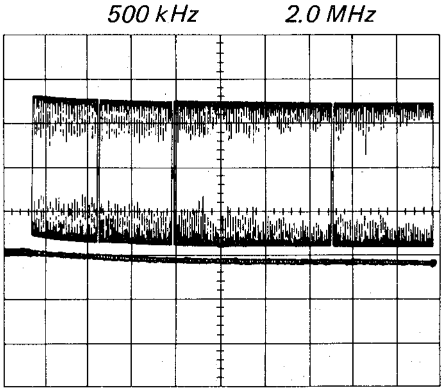
(1) Place the picture sharpness control in its center click position.

(2) Feed the video sweep signal to the line input terminal.

(3) Load a blank tape and set the VTR to the record mode.

(4) Connect the oscilloscope to TP203 and trigger the scope with a vertical sync signal at TP103. Set the scope so that it can display a waveform for more than one vertical scanning period.

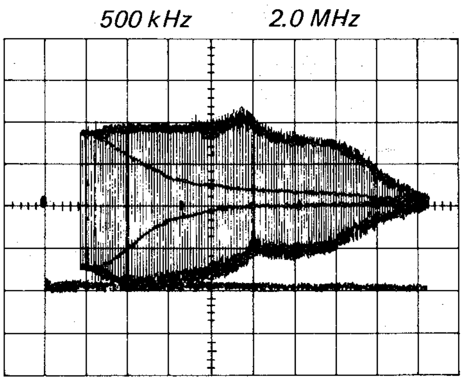
(5) Play back the tape recorded in the step (3) above. Adjust R259 so that 2.0 MHz level shows –3 ±1dB referred to the 500 kHz reference level as illustrated.



Horizontal axis: 2ms/div.
Vertical axis: Adjust as illustrated, using a calibrator.

Note: For example, if the 500 kHz level has been adjusted to show 4 scales, the 2.0 MHz level should be 2.8 ±0.2 scales.

(6) Make sure that clockwise rotation of the picture sharpness control will increase the level in the step (5) above, and counter clockwise rotation will decrease the level.
Reset the knob at its center click position.



Horizontal axis: 2ms/div.
Vertical axis: Adjust as illustrated, using a calibrator.

2-4-7 FM deviation

(1) Feed the color bar signal to the line input terminal.

(2) Connect the oscilloscope to TP215 and trigger the scope with a composite sync signal at TP204. Adjust the scope to display a waveform of approx. 2H

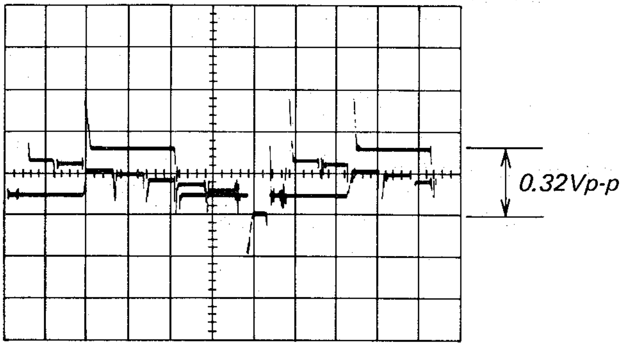
(3) Adjust R252 to obtain the amplitude of approx. 0.32Vp-p between the sync tip and the white peak. After adjusting R256 (playback Y signal output level) with the method 2-4-5, repeat above the adjustment, and then adjust R252 (FM deviation control) so that the play back Y signal output level at TP203 shows 2.0Vp-p ±0.2Vp-p.

2-4-8 Sync tip frequency

(1) Short circuit line input terminal to ground with phone jack and set the VTR to REC mode.

(2) Connect the frequency counter to TP202.

(3) Adjust R251 to obtain frequency of 3.90 MHz ±0.1 MHz.



Horizontal axis: 10µs/div.
Vertical axis: 0.2mV/div.

2-4-9 Picture sharpness preset adjustment

(1) Place the picture sharpness control in its center click position.

(2) Feed the video sweep signal to the line input terminal.

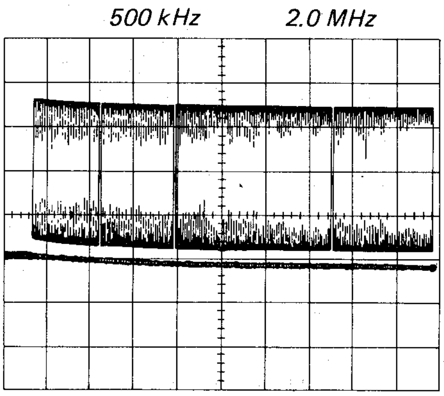
(3) Load a blank tape and set the VTR to the record mode.

(4) Connect the oscilloscope to TP203 and trigger the scope with a vertical sync signal at TP103. Set the scope so that it can display a waveform for more than one vertical scanning period.

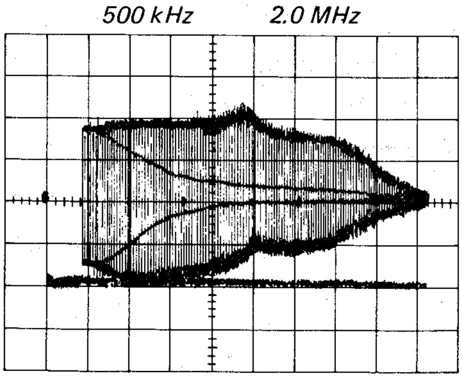
(5) Play back the tape recorded in the step (3) above. Adjust R259 so that 2.0 MHz level shows −3 ±1dB referred to the 500 kHz reference level as illustrated.

Note: For example, if the 500 kHz level has been adjusted to show 4 scales, the 2.0 MHz level should be 2.8 ±0.2 scales.

(6) Make sure that clockwise rotation of the picture sharpness control will increase the level in the step (5) above, and counter clockwise rotation will decrease the level.
Reset the knob at its center click position.



Horizontal axis: 2ms/div.
Vertical axis: Adjust as illustrated, using a calibrator.



Horizontal axis: 2ms/div.
Vertical axis: Adjust as illustrated, using a calibrator.

2-5. Audio Circuit

Notes:

- Adjustments for the playback frequency response and playback output level may not be performed if the audio control head is improperly positioned on the audio track. In such a case, perform the azimuth adjustment and height adjustment perfectly, and then proceed the adjustments 2-4-1 – 2-4-5.
- When using alignment tapes other than those specified below always make sure that interchangeability is assured for the tapes before proceeding the adjustments.

2-5-1 Playback output level

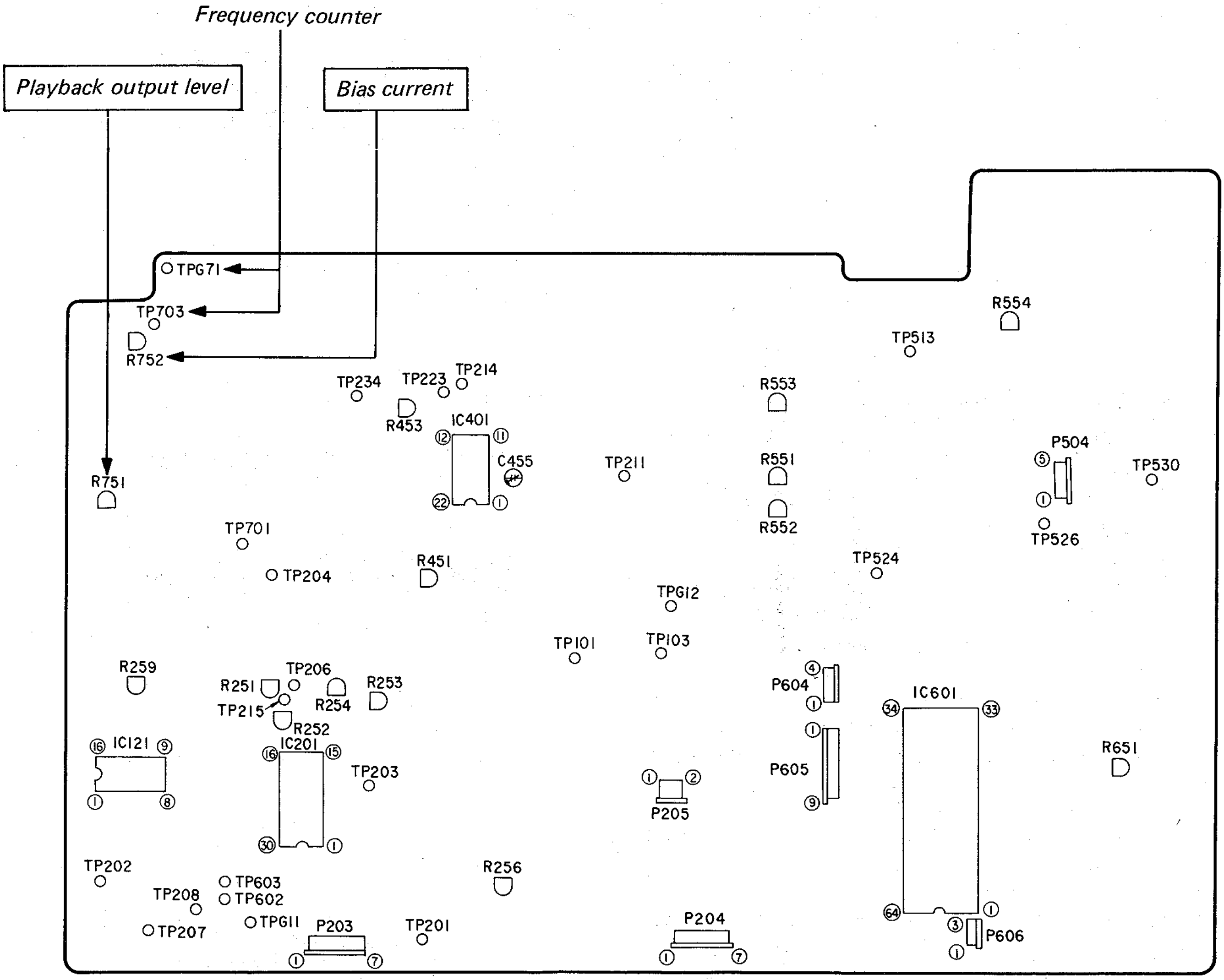
(1) Terminate to the audio line output terminal with a 47k ohm resistor and playback the alignment tape (MH-2).

(2) Adjust R751 until output level obtains –7 dBs ±0.5 dBs.

2-5-2 Record/Erase oscillator frequency

(1) Connect the frequency counter across TP703 and TPG71 (ground).

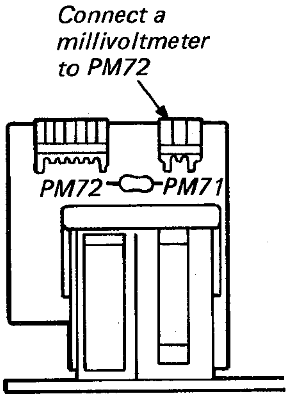
(2) Set the VTR to record mode and check that the frequency counter shows 68 kHz ±6.8 kHz.


Frequency counter
Playback output level
Bias current
TPG71
TP703
R752
R751
TP234
TP223
TP214
R453
IC401
C455
TP211
R553
R551
R552
R554
TP513
P504
TP530
TP526
TP524
TP701
TP204
R451
TPG12
TP101
TP103
R259
TP206
R251
R253
TP215
R254
R252
IC121
IC201
TP203
P604
P605
IC601
R651
P205
TP202
TP208
TP603
TP602
TP207
TPG11
P203
TP201
R256
P204
P606

Main (Video, Servo, Logic, Audio) PC Board

2-5-3 Bias current

1. Short circuit the audio line input terminal, creating no input signal condition. Connect a millivoltmeter to PM72 ① – ② (GND).
2. Set the VTR to the record mode and adjust R752 to obtain 2.5mV rms.


Connect a millivoltmeter to PM72
PM72
PM71

2-5-4 Record/playback frequency characteristics

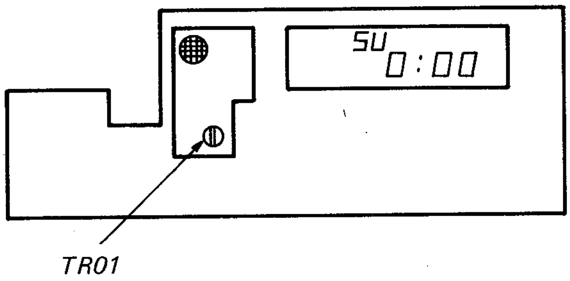
1. Terminate the audio line output terminal with a 47k ohm resistor.
2. Apply 400 Hz and 8 kHz signals of –25 dBs to audio line input terminal, and record the signal.
3. Playback the signals just recorded and check that the output of 8 kHz is 0 dB ±4 dB referred to the output of 400 Hz.
4. If the 8 kHz output is higher than that of 400 Hz by more than 4 dB, adjust the bias current to a value higher than 2.5 mVrms; and if the 8 kHz output is lower than that by less than –4 dB, adjust the bias current to a value lower than 2.5mV rms.

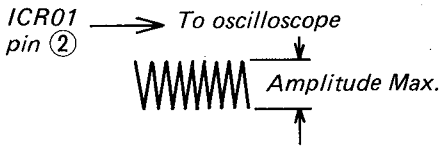
2-5-5 Record/playback output level

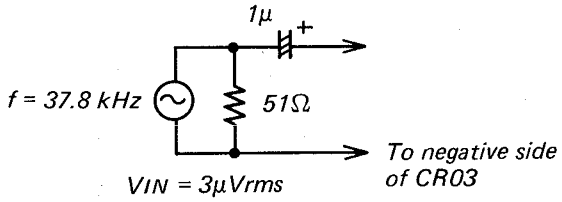
1. Terminate the audio line output terminal with a 47k ohm resistor.
2. Feed 400 Hz, –10 dBs signal to the audio line input terminal and record the signal.
3. Reproduce the signal just recorded and make sure the playback output level is –7 dBs ±3 dB.

2-6. Wireless Remote Control Circuit

1. Connect the oscilloscope across pin ② of ICR01 and ground. (Use a probe of 10 : 1.)
2. Feed a signal of 37.8 kHz with amplitude of 3μVrms across pin ⑧ of ICR01 and (–) side of CR03 through the network as shown.
3. Adjust TR01 for the maximum amplitude on the scope display.




ICR01 pin ②
To oscilloscope
Amplitude Max.


1μ
+
f = 37.8 kHz
51Ω
To negative side of CR03
VIN = 3μVrms

SECTION 3

SERVICING DIAGRAMS

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1. Inspection Procedure

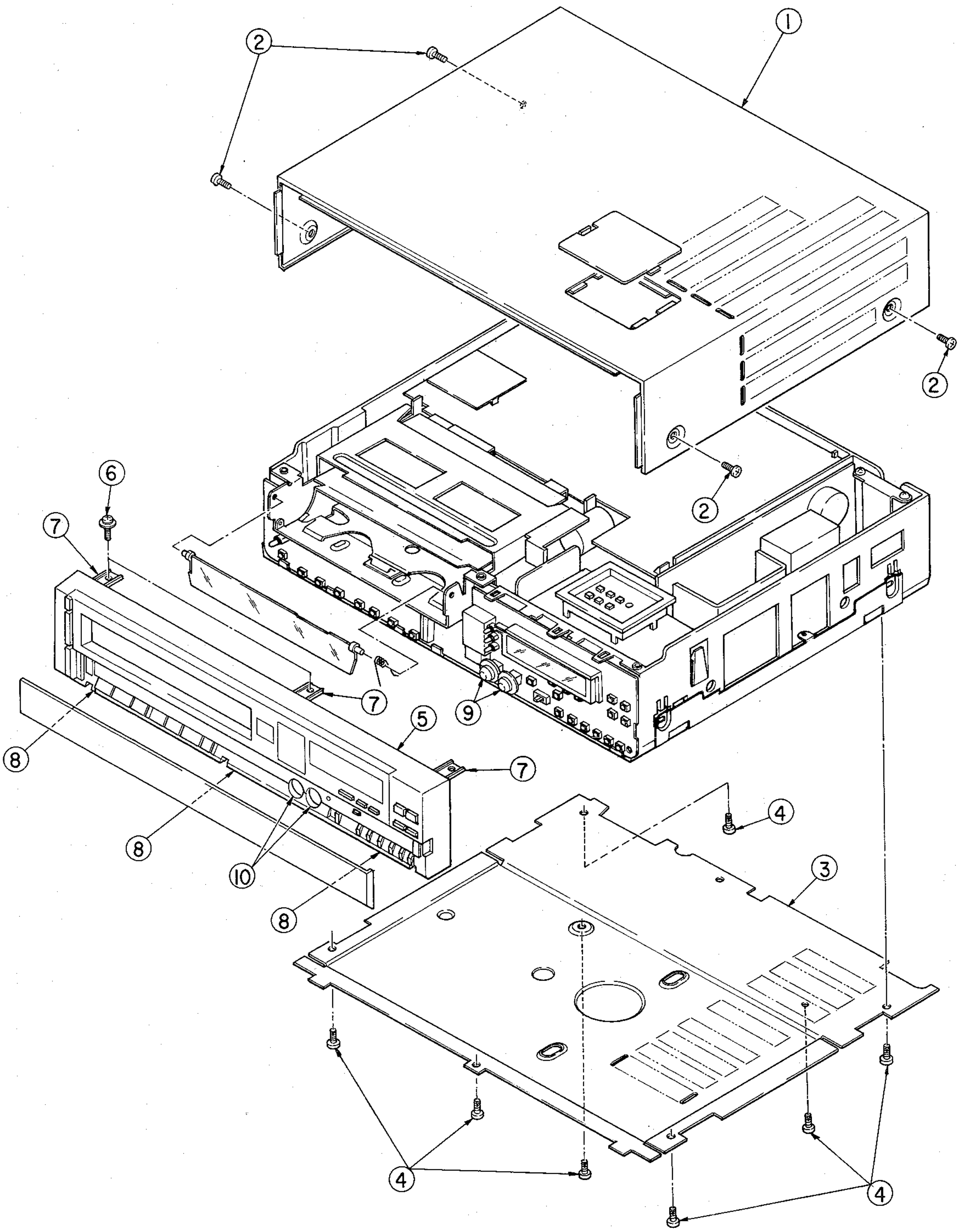
Operation steps		Items to confirmed	Inspection block	Page	
				Block Diagram	Circuit Diagram
1. AC Plug-in	Time setting Program timer setting	Clock display Time setting operation	Power (AC system) Timer counter (V-81G/W) Timer counter (V-83G/W)	13 18 19	39 51 55
2. Power SW ON	Timer/counter, memory, AFC operation, EE picture & tone quality	Mode display lamp TV receive condition Channel select operation, AFC operation level, EE picture quality, Tone Signal level	Power Logic RF, reception (V-81/83G) RF, reception (V-81/83W) Video (EE, Rec mode) Audio (EE, Rec mode)	13 24 15 16 33 36	39 59 43 47 71 75
3. Cassette-in and Cassette-out	Cassette-in Cassettte loading Eject Cassette-out	F/L mecha. operation Cassette loading operation Eject operation Indicator lamp Abnormal sound	Logic	24	59
4. Key enter Operation Remote-control	REC, PLAY Cue/Review Still, Frame feeding/slow FF/REW Auto play (REW ON → PLAY ON)	Indicator lamp Each mode operation (Tape drive operation Abnormal sound Auto play operation	Logic Remote control block	24 77	59 78
5. Special Functions Auto Power ON Auto Rewind	Cassette-in at Power OFF REC/PLAY/CUE	Power ON, Cassette down Rewind automatically after tape wound	Power Logic	13 24	39 59
6. Playback Function Picture Quality Tone Quality Others	PLAY (Test tape: MH-2) Cue/Review Still/Slow	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter, Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	33 36 30	71 75 65
7. REC/PLAY Functions Picture Quality Tone Quality Others	REC/PLAY	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter, Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo sysytem	33 36 30	71 75 65

How to use the table

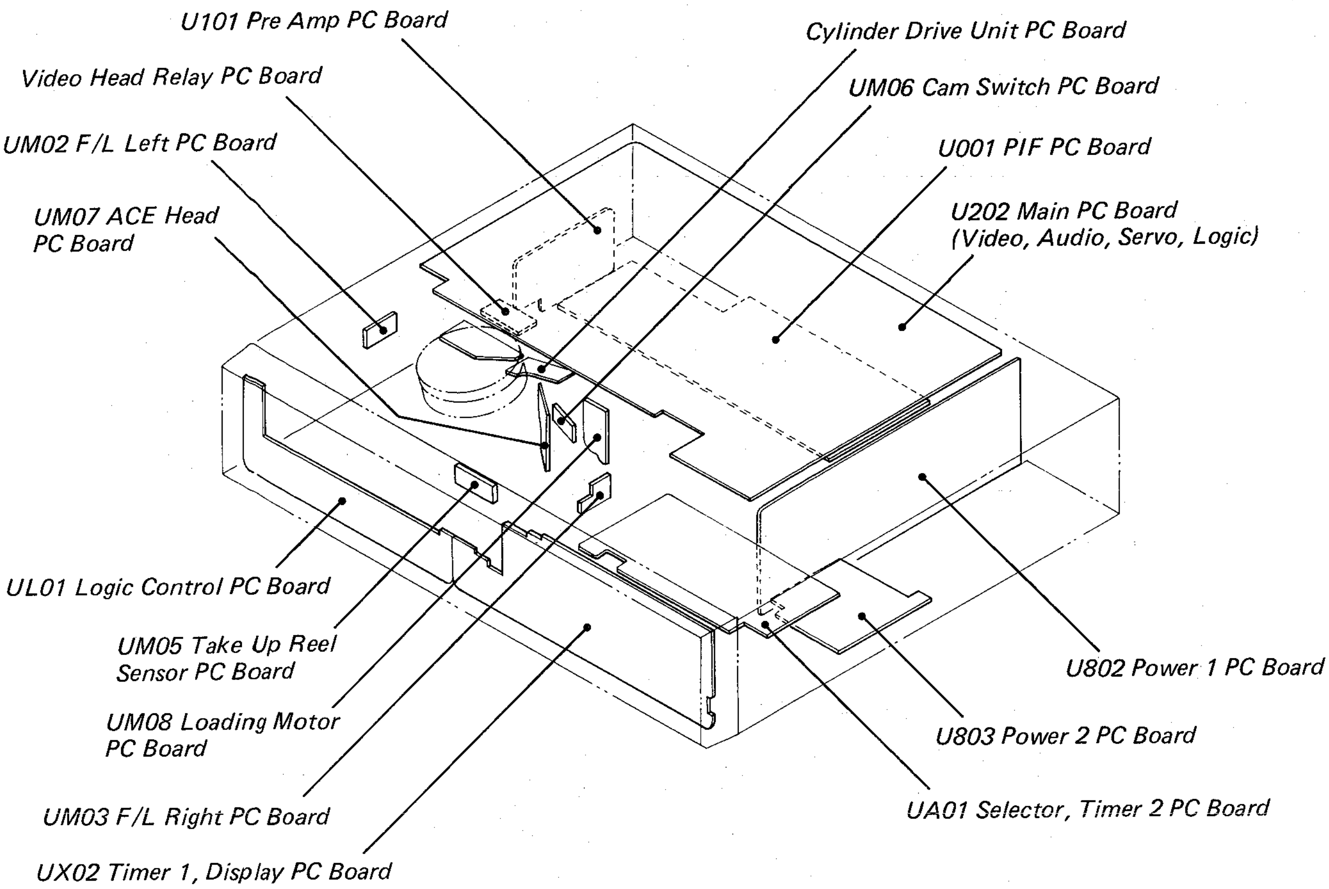
1. When inspecting a defective VTR, proceed according to the steps shown in the table.
2. Check the items to be confirmed for each operation step.
3. If a problem is found on the item, check waveforms (level) referring to the block diagram relating to the items.
4. Use PC board pattern diagram and schematic diagram to examine the circuit precisely.
5. After completion of the repair work, check stepa 1 ~ 7 again.

2. Removal of Cabinet

(1) Disconnect power cord plug from AC outlet.
(2) Remove 4 screws ② securing top cover ① .
(3) Remove the top cover ① by sliding it backward.
(4) Remove 7 screws ④ securing bottom cover ③ , then remove the bottom cover.
(5) Remove 2 screws ⑥ securing front panel ⑤ .
(6) Remove the front panel ⑤.

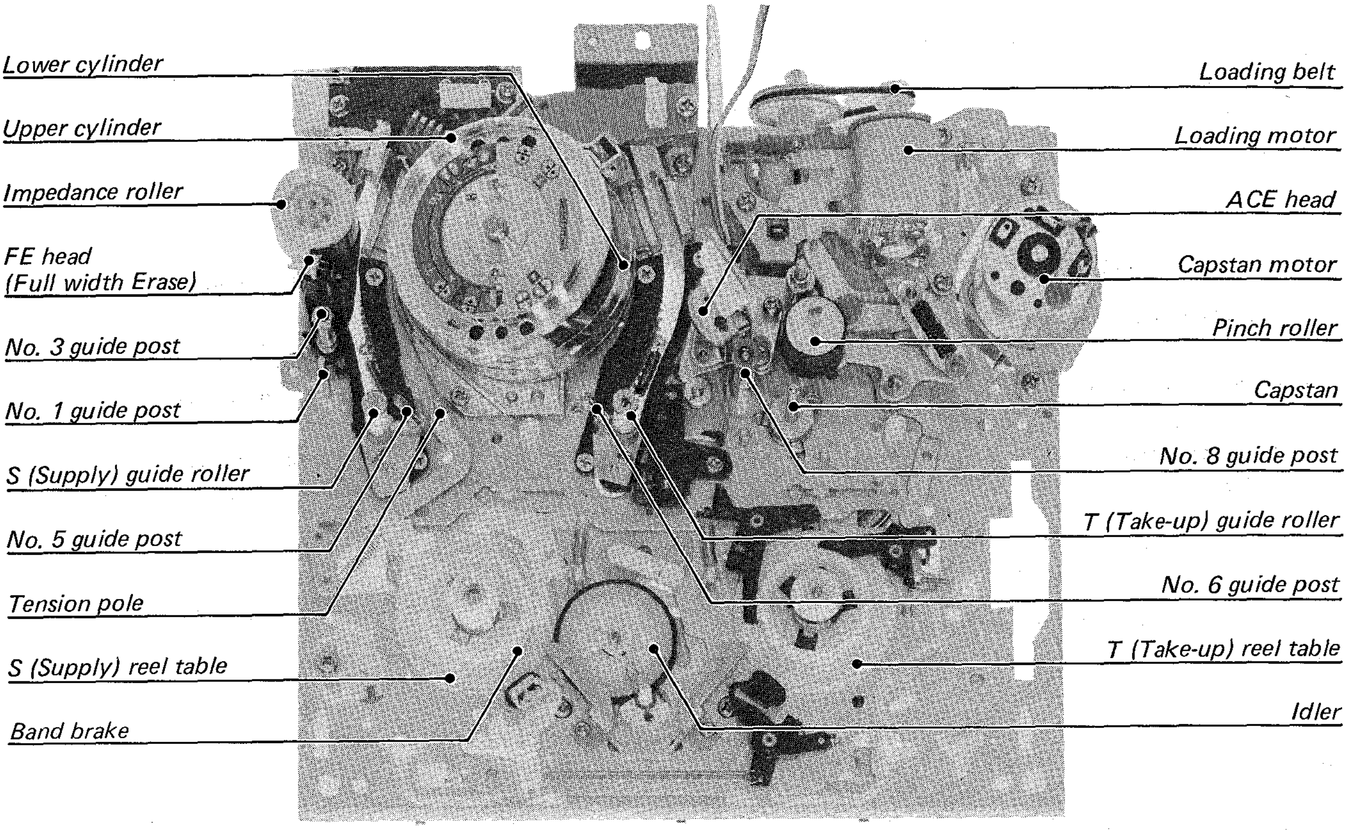


3. Electrical Units Location Diagram

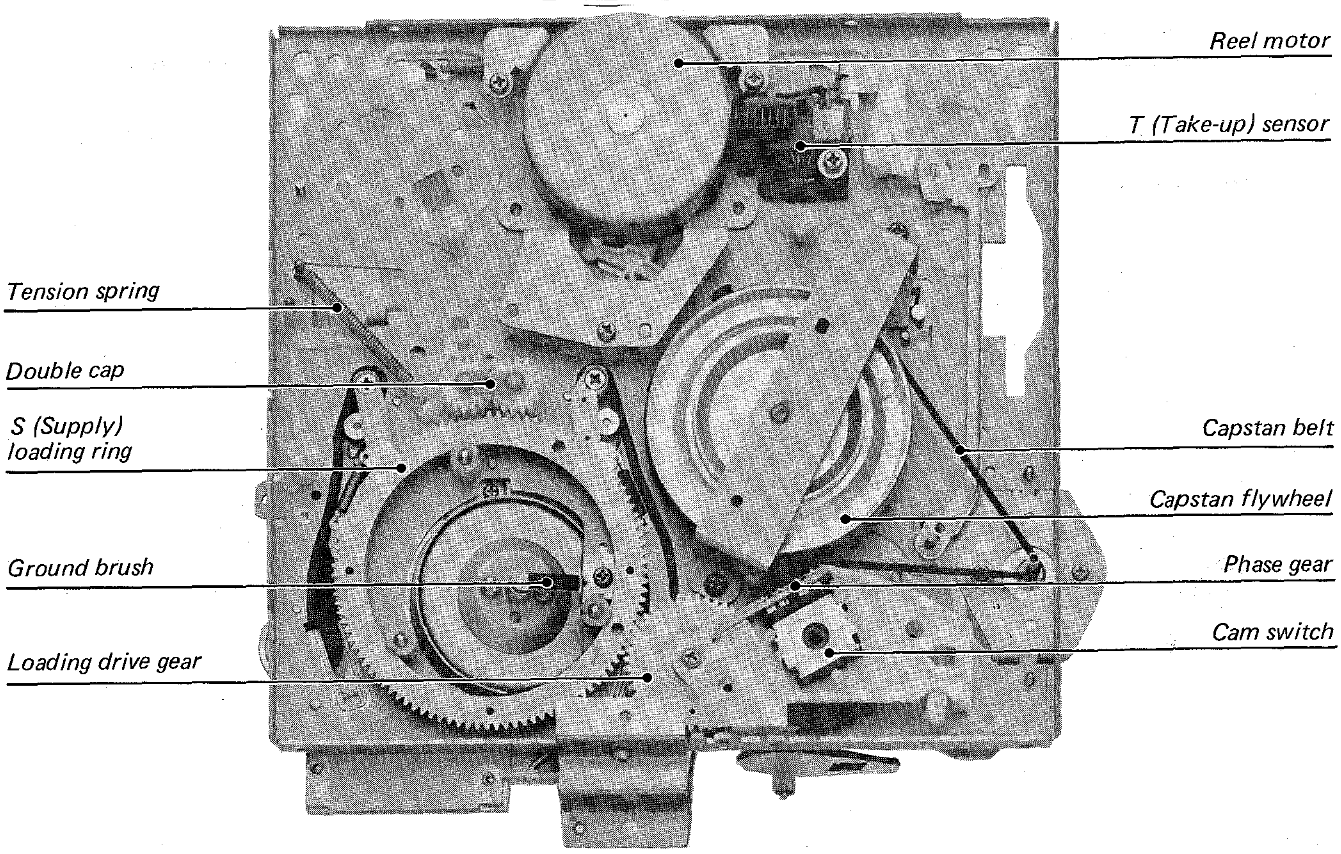

U101 Pre Amp PC Board
Video Head Relay PC Board
UM02 F/L Left PC Board
UM07 ACE Head PC Board
Cylinder Drive Unit PC Board
UM06 Cam Switch PC Board
U001 PIF PC Board
U202 Main PC Board (Video, Audio, Servo, Logic)
UL01 Logic Control PC Board
UM05 Take Up Reel Sensor PC Board
UM08 Loading Motor PC Board
UM03 F/L Right PC Board
UX02 Timer 1, Display PC Board
U802 Power 1 PC Board
U803 Power 2 PC Board
UA01 Selector, Timer 2 PC Board

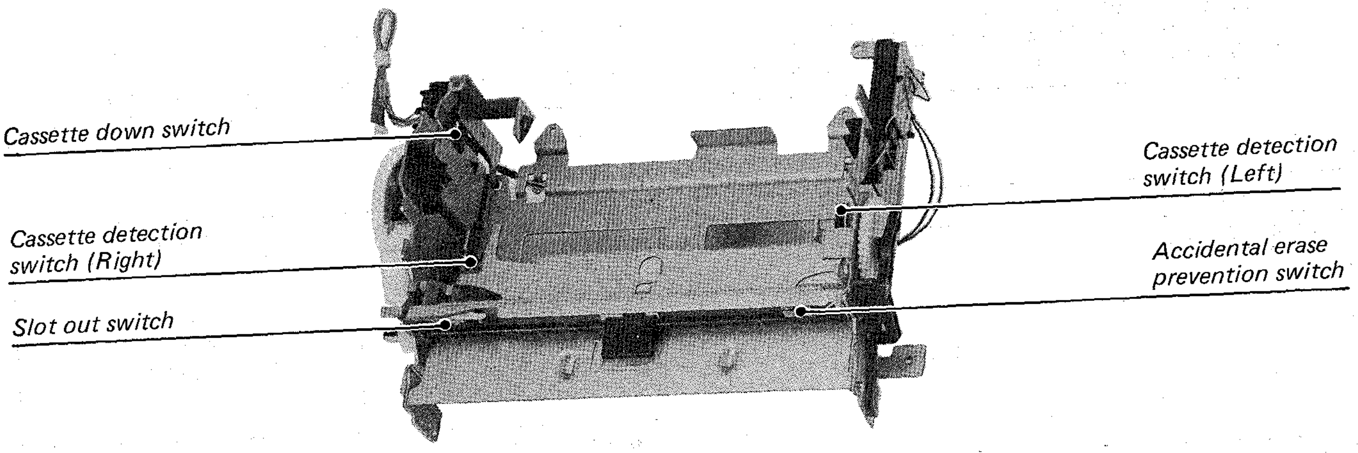
4. Mechanical Parts Location

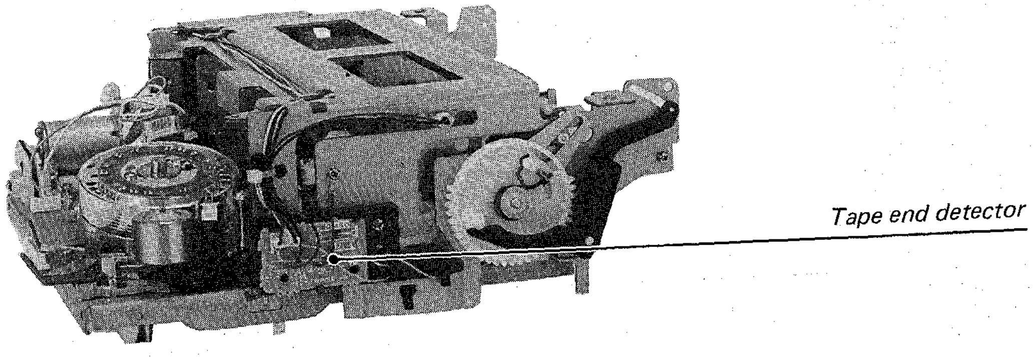
Top View

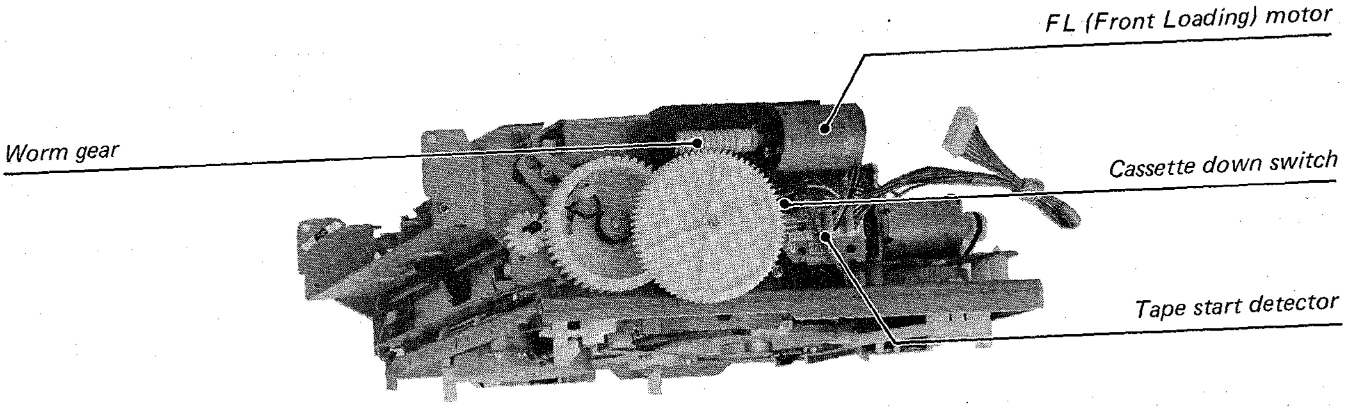

Lower cylinder
Upper cylinder
Impedance roller
FE head
(Full width Erase)
No. 3 guide post
No. 1 guide post
S (Supply) guide roller
No. 5 guide post
Tension pole
S (Supply) reel table
Band brake
Loading belt
Loading motor
ACE head
Capstan motor
Pinch roller
Capstan
No. 8 guide post
T (Take-up) guide roller
No. 6 guide post
T (Take-up) reel table
Idler

Bottom View


Reel motor
T (Take-up) sensor
Tension spring
Double cap
S (Supply)
loading ring
Ground brush
Loading drive gear
Capstan belt
Capstan flywheel
Phase gear
Cam switch


Cassette down switch
Cassette detection switch (Right)
Slot out switch
Cassette detection switch (Left)
Accidental erase prevention switch


Tape end detector


FL (Front Loading) motor
Worm gear
Cassette down switch
Tape start detector

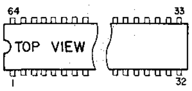
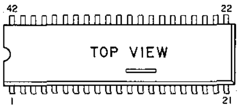
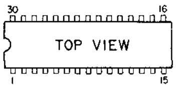
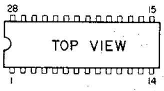
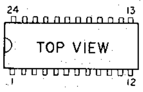
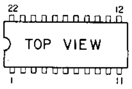
5. Part Configuration and their Symbols

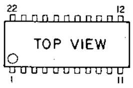
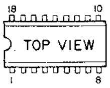
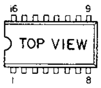
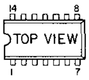
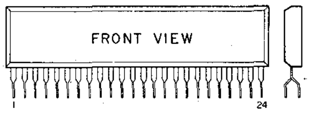
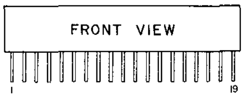
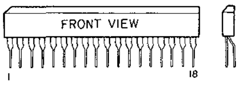
NOTE:

Precautions for Part Replacement

- In the schematic diagram, parts marked ⚠ (ex. ⚠ F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
- Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire, etc.

1. IC's

Name	Shape
TMP4746-5760, TMP4746N5759	 64 33 TOP VIEW 1 32
CX20097, CX20105, CX7989, TA7788AP, TCP4633-9822X, TCP4633-9831X, TC6360P, TD6314P-01, TD6314P-05, TL8702P, TMP4315-0135X, TMP4320-6358Y, TMP4320-6391Y, TMP4320-6445Y, TMP4320-6448Y, TMP4320-6451Y, TMP4320-6453Y, TMP4320-6454Y, TMP4320-6455Y, TMP4320-6457Y, TMP4320-6458Y, TMP47C410-6775, TMP47C410-6783, TMP47C410AN6784	 42 22 TOP VIEW 1 21
M50430-085SP, TA7744P, TA8605N	 30 16 TOP VIEW 1 15
CX20026	 28 15 TOP VIEW 1 14
TA8606N	 24 13 TOP VIEW 1 12
AN6366NK, AN6367K, BA7267S	 22 12 TOP VIEW 1 11

Name	Shape
LA7090	 22 12 TOP VIEW 1 11
BA668A, BU2763S, MN6163A, TA7743P	 18 10 TOP VIEW 1 8
CXA1011P, LA1231N, SN7442AN, SN7442AN, TA7607AP, TA7742P, TA7745P, TA7772P, TA86079, TC4015PB, TC4028BP, TC4051BP, TC4052BP, TC4053BP, TC4512BP, TC4538BP, TC5067BP, TC74HC42P, TD62504P, TL8610P	 16 9 TOP VIEW 1 8
CX7982, TA75339P, TA75902P, TA7741P, TC4001BP, TC4013BP, TC4030BP, TC4066BP	 14 8 TOP VIEW 1 7
M51643L	 FRONT VIEW 1 24
HK-001A	 FRONT VIEW 1 19
BA7025L	 FRONT VIEW 1 18

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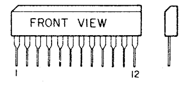
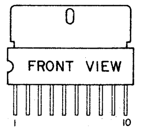
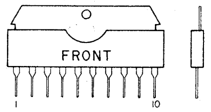
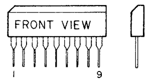
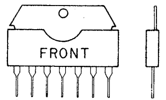
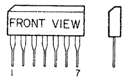
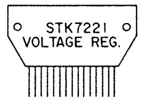
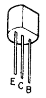
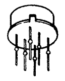
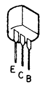
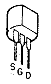
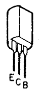
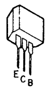
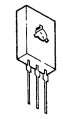
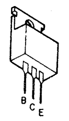
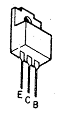
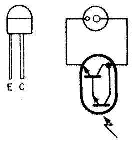
TA7328AP	 FRONT VIEW 1 12
BA6209	 FRONT VIEW 1 10
TA7277AP, TA7277BP, TA7288P	
μPC1474HA, BA6138, TA7325P, TA7337P, TA7339P, TA7348P, TA7351P, TA7365P, TA75393S, TA75458S	 FRONT VIEW 1 9
TA7267P	
BA222, TA7140P, TA7302P, TA7347P, TA7361P	 FRONT VIEW 1 7
SKT7221	 STK7221 VOLTAGE REG.
PST520C, PST520D	
LQT-50X-1	

2. Transistors

Name	Shape
2SA562RM-Y, 2SCA1015Y, 2SC1815-Y, 2SC1923-O, 2SC1923, 2SC1959-Y, 2SC2878-A, 2SC2878-B, 2SC388ATH, 2SD970GR	
2SK30ATH-R, 2SK30ATH-Y, 2SK30ATM-GR	
2SA1020-Y, 2SA966-Y, 2SC2236-Y, 2SC2655-Y	
RN1201, RN1202, RN1203, RN1204, RN1205, RN1206, RN2201, RN2202, RN2203, RN2204, RN2205, RN2206, 2SA1048-Y, 2SC2458-BL, 2SC2458-GR, 2SC2458-Y	
2SD549	
2SA968-Y, 2SB435-Y, 2SB834-O, 2SC3678, 2SD1052AFA, 2SD235-GR, 2SD553-Y, 2SD686, 2SD880-Y	
2SD1273-Q, 2SD1405-BL, 2SD1407-O, 2SD1407-Y, 2SD1409, 2SD1415	
PN202S-R, TH, PN202S-RS	

3. Diodes

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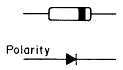
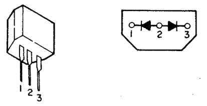
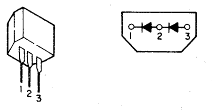
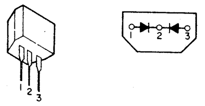
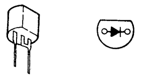
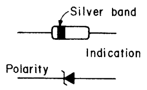
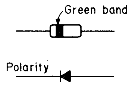
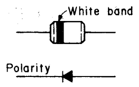
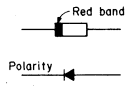
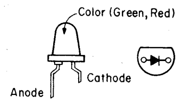
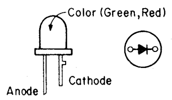
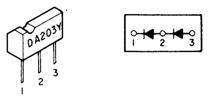
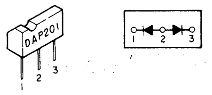
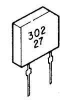
1S1553, 1S1554 (TV), 1S1555 (TV), 1S2236	
1SS200	
1SS227	
1SS201	
μPC574J	
05Z10-Y, 05Z11-Y, 05Z12-Y, 05Z12-Z, 05Z15-Z, 05Z2.2-Z, 05Z2.7-Y, 05Z20-Z, 05Z3.6-Z, 05Z3.9-X, 05Z3.9-Y, 05Z5.1-X, 05Z5.1-Z, 05Z5.6-Y, 05Z5.6-Z, 05Z6.2-Y, 05Z6.2-Z, 05Z6.8Y, 05Z7.5-Y, 05Z8.2-X, 05Z8.2-Y, 05Z9.1-X, 05Z9.1-Y	 Silver band Indication Polarity
1SS176	 Green band Polarity

Name	Shape
ERC01-02FL	 White band Polarity
ERA12-02 (White band) S1S3M (Red band) S2K20C (Red band) S5295G (Yellow band) TVR-4J (Gray band) 1S1832 (Yellow band) 1S1885 (Light Blue) 1S878AFA (Cyan band) 30DF1(FC) (Silver band)	 Red band Polarity
TLUG163, TLUR163, TLUR164	 Color (Green, Red) Anode Cathode
TLG113A, TLR113AD	 Color (Green, Red) Anode Cathode
DA203	
DAP201	
PH302	

4. Solid resistor indication

Resistor	1/8W film	P type film	U type film	Solid	Oxide film	Metal film	Cement	Fuse
Symbol	None	P	U	S	R	W	W	RF

Tolerance	±2%	±5%	±10%	±20%
Symbol	G	J	None	None

- All film type and oxide film type resistors used are ±5%, so the tolerance symbol was not indicated for them.

5. Capacitor indication

Description	Symbol	Capacitance, unit	Capacitance allowance
Electrolytic	+⊣⊢	μF	Not indicated
Special electrolytic			Indicated
Plastic film	⊣⊢	μF: indicated with numbers below decimal point	Indicated below ±5% (J), indicated below ±0.5pF, not indicated for others
Ceramic		pF: indicated with numbers over decimal point	
Trimmer	⊣⊢↗	pF	Not indicated

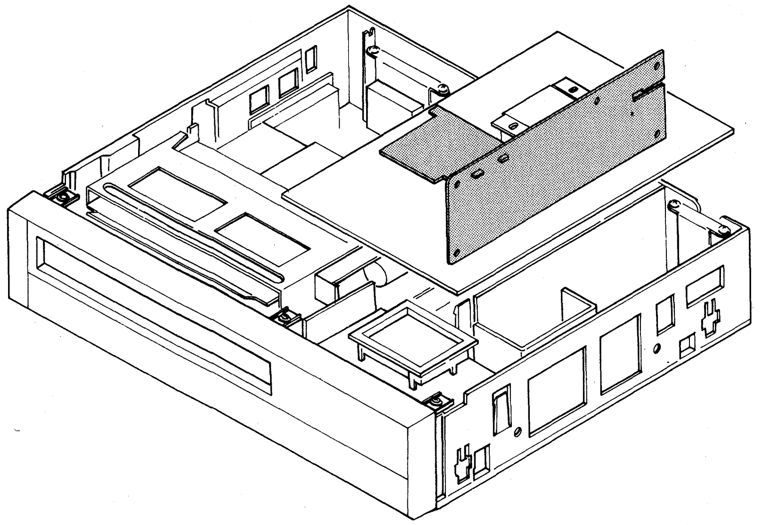
Note: No working voltage is indicated for capacitors rated at 50V except electrolytic capacitors.

6. Waveform and voltage measurement

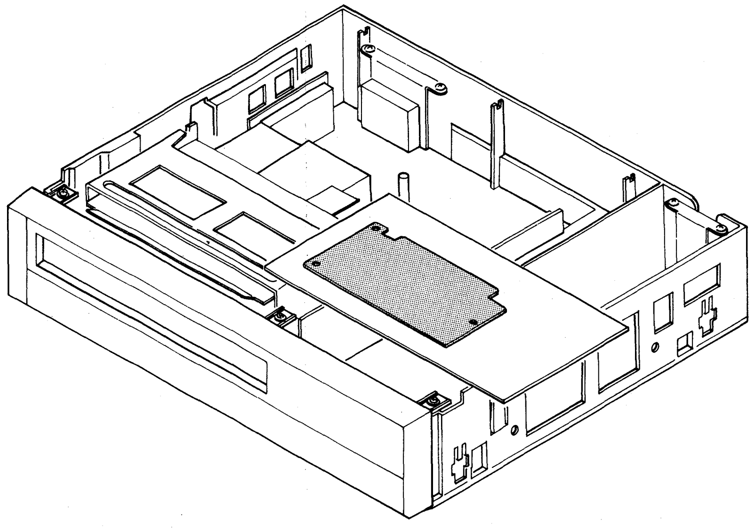
- Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
- Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
- All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

6. Standing PC Boards for Servicing

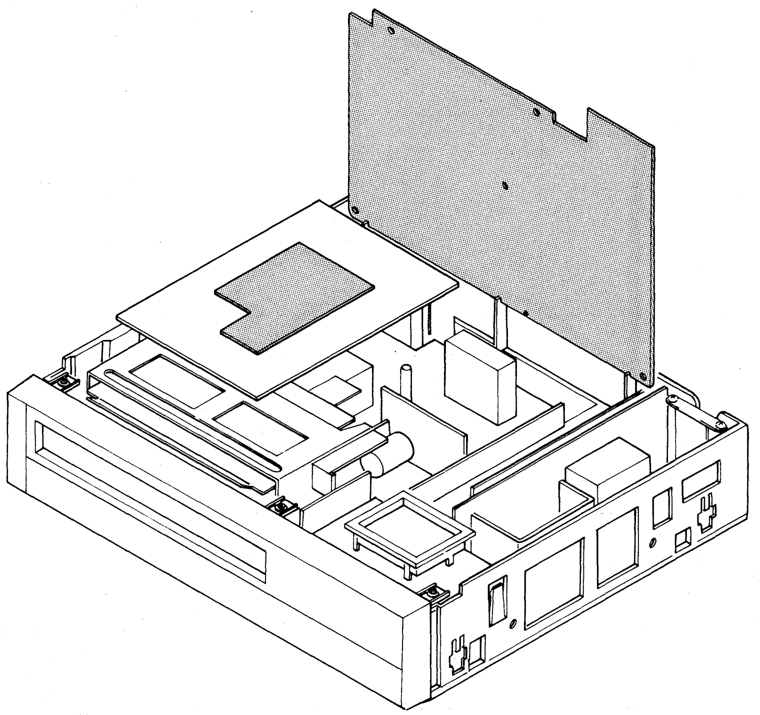
Power Supply PC Board



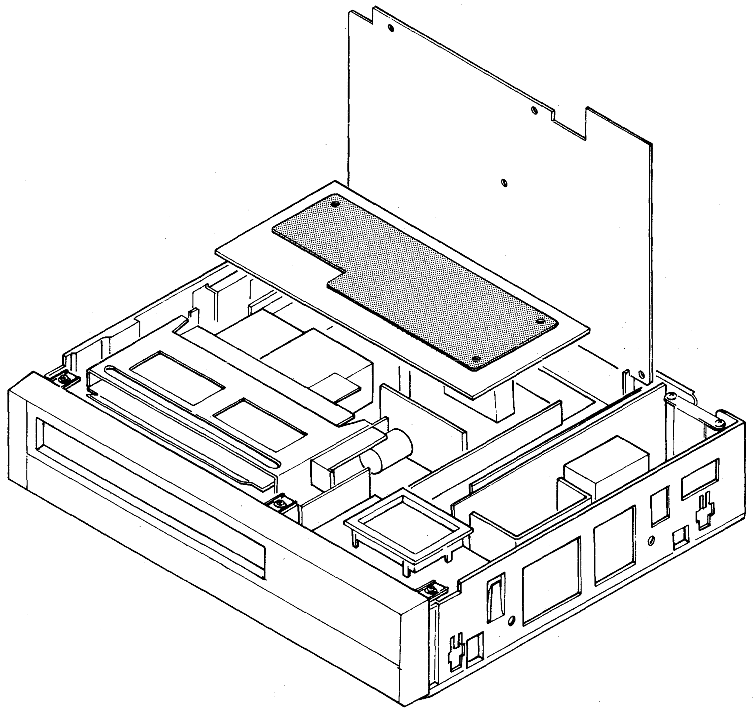
Selector, Timer 2 PC Board



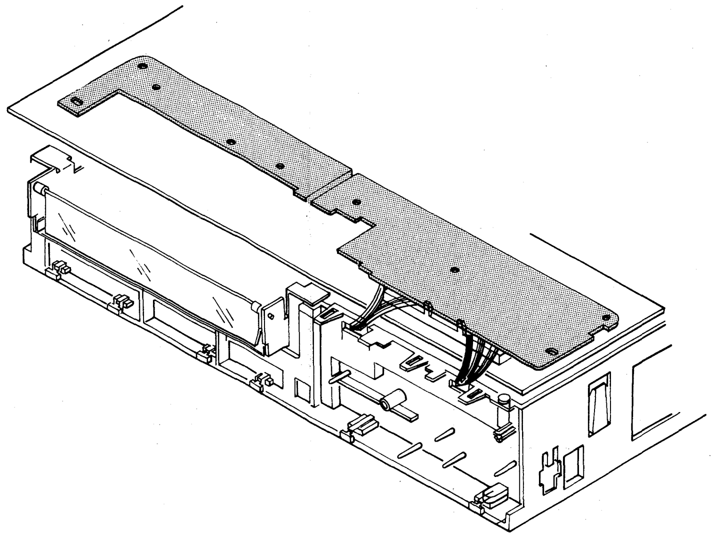
Main (Video, Audio, Servo, Logic), Pre Amp PC Board



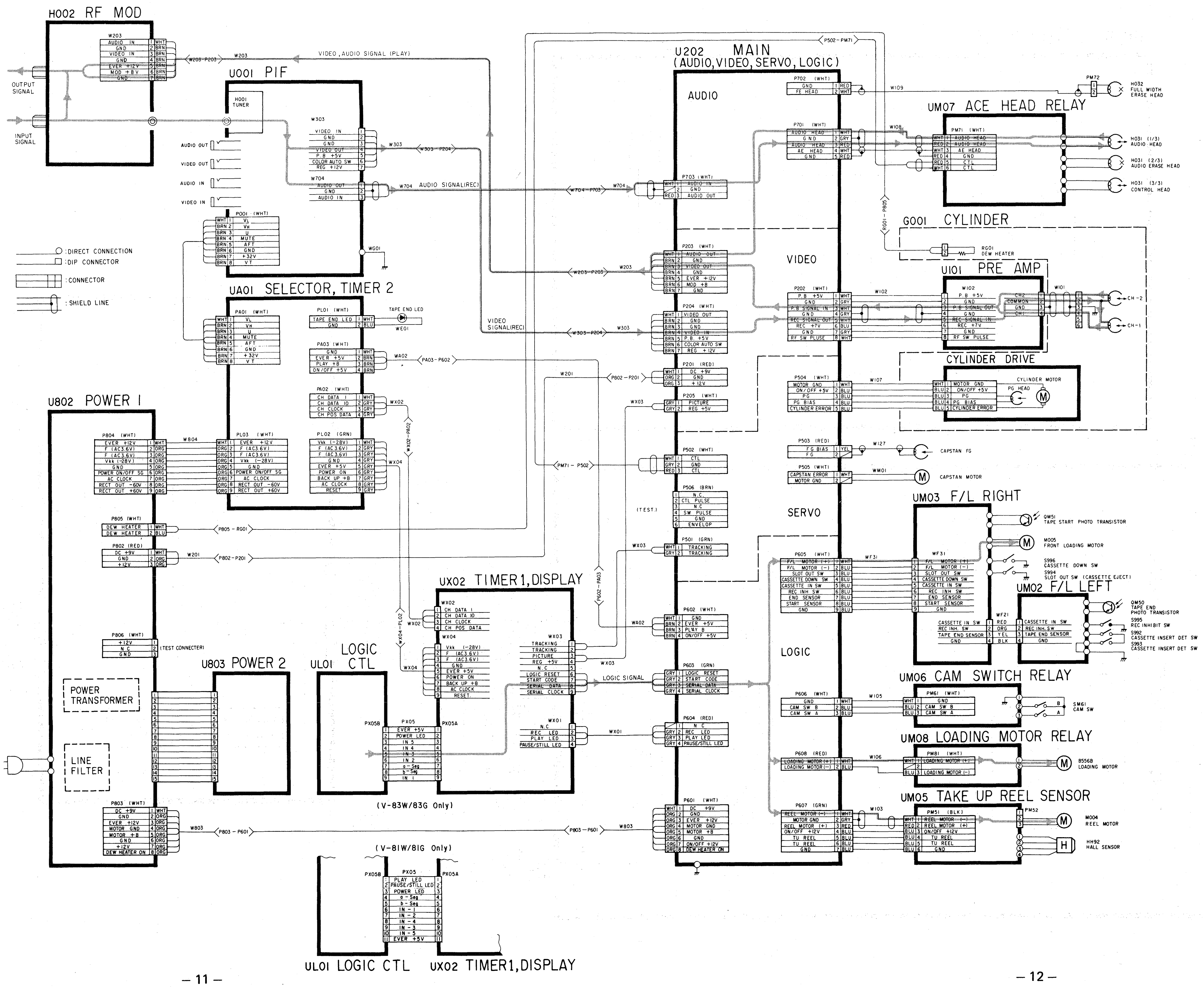
PIF PC Board



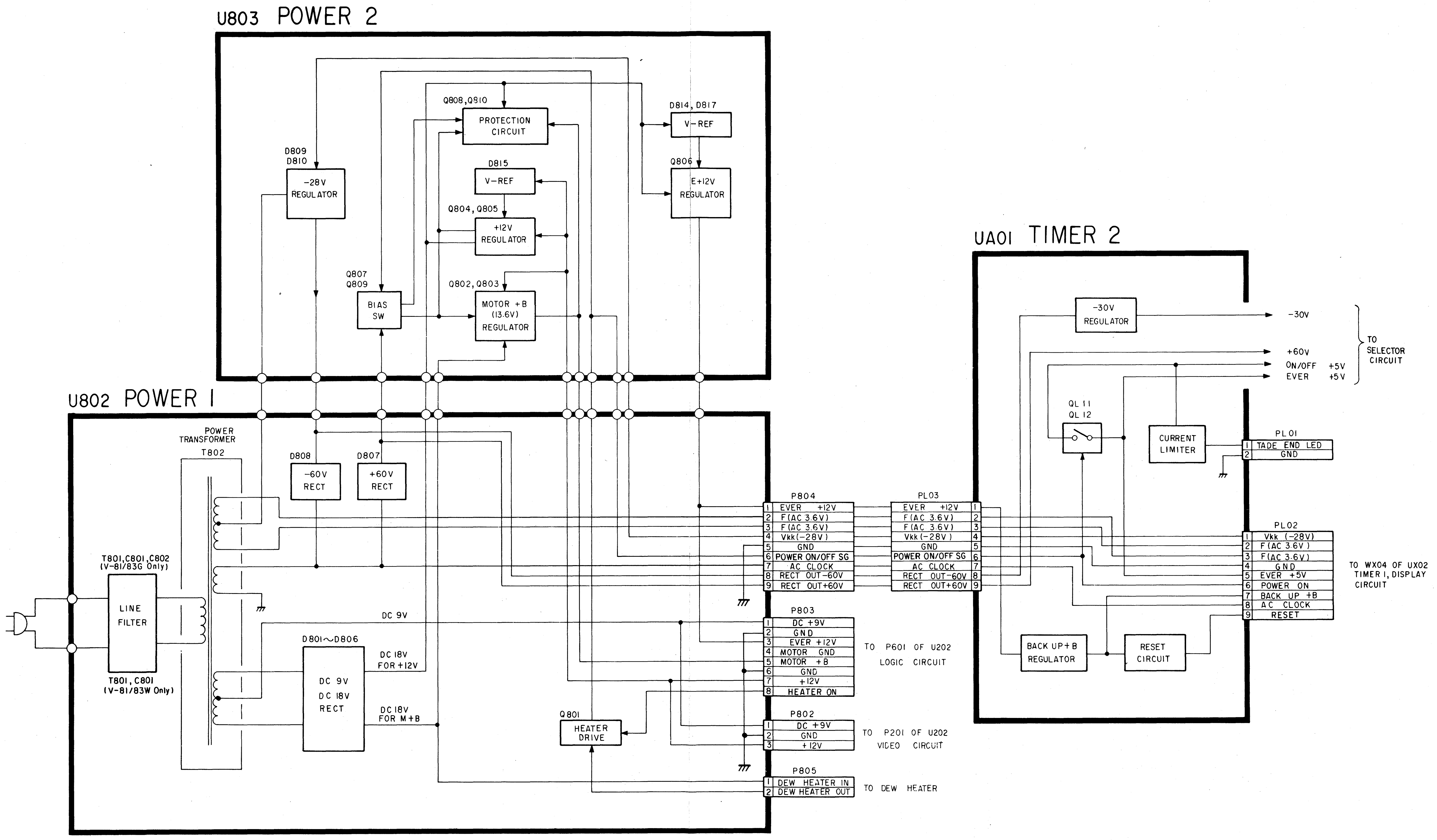
Timer 1, Logic Control Switch PC Board



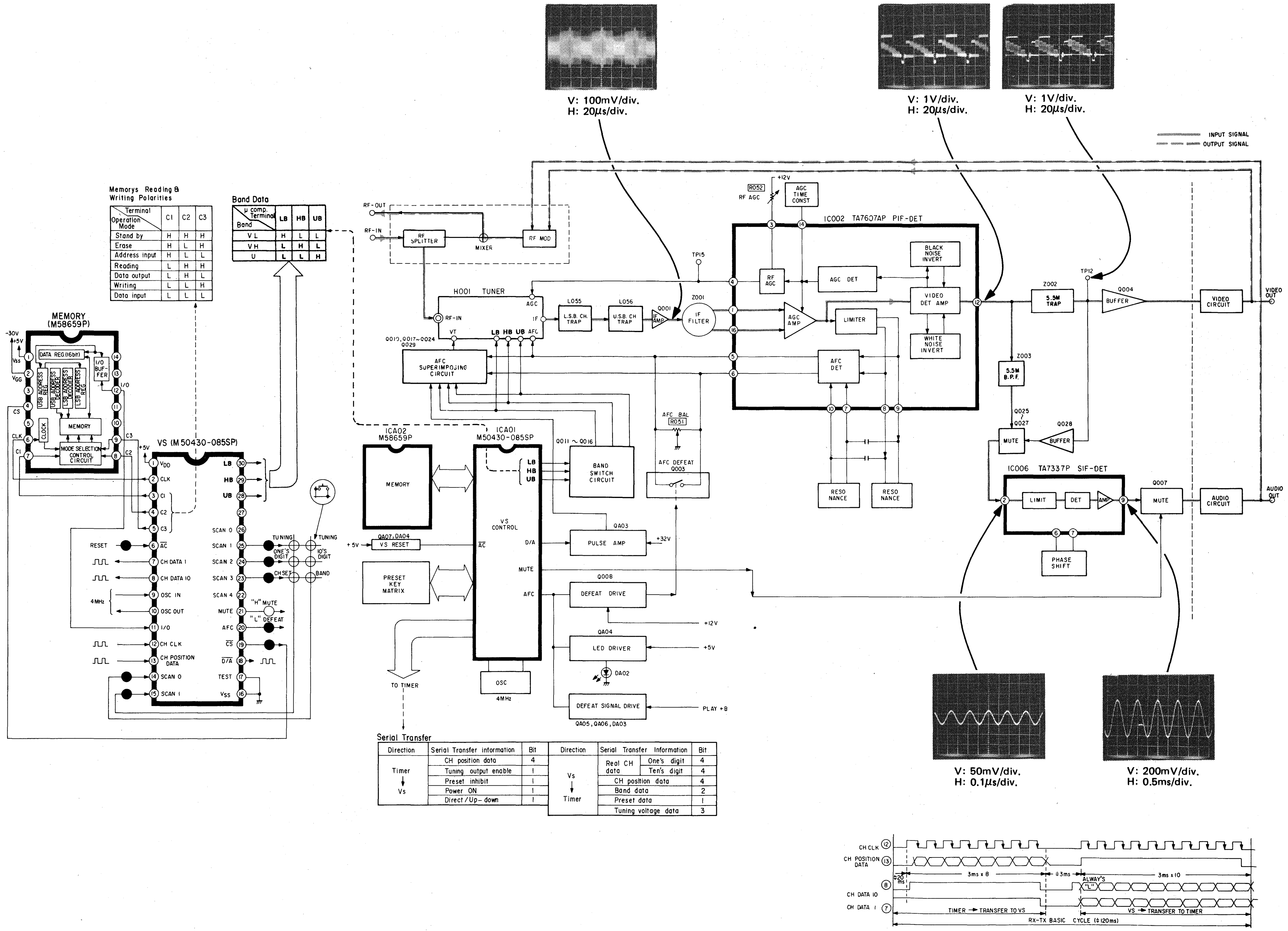
7. Printed Wiring Board and Schematic Diagram


H002 RF MOD
OUTPUT SIGNAL
INPUT SIGNAL
U001 PIF
H001 TUNER
AUDIO OUT
VIDEO OUT
AUDIO IN
VIDEO IN
VIDEO, AUDIO SIGNAL (PLAY)
AUDIO SIGNAL(REC)
VIDEO SIGNAL(REC)
○ :DIRECT CONNECTION
□ :DIP CONNECTOR
:CONNECTOR
:SHIELD LINE
UA01 SELECTOR, TIMER 2
TAPE END LED
U802 POWER I
POWER TRANSFORMER
LINE FILTER
U803 POWER 2
UL01 LOGIC CTL
UX02 TIMER1,DISPLAY
(V-83W/83G Only)
(V-81W/81G Only)
U202 MAIN (AUDIO,VIDEO,SERVO,LOGIC)
AUDIO
VIDEO
SERVO
LOGIC
(TEST)
LOGIC SIGNAL
UM07 ACE HEAD RELAY
H032 FULL WIDTH ERASE HEAD
H031 (1/3) AUDIO HEAD
H031 (2/3) AUDIO ERASE HEAD
H031 (3/3) CONTROL HEAD
G001 CYLINDER
RG01 DEW HEATER
U101 PRE AMP
CH-2
CH-1
CYLINDER DRIVE
CYLINDER MOTOR
PG HEAD
CAPSTAN FG
CAPSTAN MOTOR
UM03 F/L RIGHT
QM51 TAPE START PHOTO TRANSISTOR
M005 FRONT LOADING MOTOR
S996 CASSETTE DOWN SW
S994 SLOT OUT SW (CASSETTE EJECT)
UM02 F/L LEFT
QM50 TAPE END PHOTO TRANSISTOR
S995 REC INHIBIT SW
S992 CASSETTE INSERT DET SW
S993 CASSETTE INSERT DET SW
UM06 CAM SWITCH RELAY
SM61 CAM SW
UM08 LOADING MOTOR RELAY
B556B LOADING MOTOR
UM05 TAKE UP REEL SENSOR
M004 REEL MOTOR
HH92 HALL SENSOR

8-1. Power Supply Block Diagram


U803 POWER 2
Q808, Q810
PROTECTION CIRCUIT
D814, D817
V-REF
D809
D810
-28V REGULATOR
D815
V-REF
Q806
E+12V REGULATOR
Q804, Q805
+12V REGULATOR
Q807
Q809
BIAS SW
Q802, Q803
MOTOR +B (13.6V) REGULATOR
U802 POWER 1
POWER TRANSFORMER
T802
D808
-60V RECT
D807
+60V RECT
T801, C801, C802 (V-81/83G Only)
LINE FILTER
T801, C801 (V-81/83W Only)
DC 9V
D801~D806
DC 9V DC 18V RECT
DC 18V FOR +12V
DC 18V FOR M+B
Q801
HEATER DRIVE
P804
1 EVER +12V
2 F(AC 3.6V)
3 F(AC 3.6V)
4 Vkk(-28V)
5 GND
6 POWER ON/OFF SG
7 AC CLOCK
8 RECT OUT-60V
9 RECT OUT+60V
PL03
EVER +12V 1
F(AC 3.6V) 2
F(AC 3.6V) 3
Vkk(-28V) 4
GND 5
POWER ON/OFF SG 6
AC CLOCK 7
RECT OUT-60V 8
RECT OUT+60V 9
P803
1 DC +9V
2 GND
3 EVER +12V
4 MOTOR GND
5 MOTOR +B
6 GND
7 +12V
8 HEATER ON
TO P601 OF U202 LOGIC CIRCUIT
P802
1 DC +9V
2 GND
3 +12V
TO P201 OF U202 VIDEO CIRCUIT
P805
1 DEW HEATER IN
2 DEW HEATER OUT
TO DEW HEATER
UA01 TIMER 2
-30V REGULATOR
-30V
+60V
ON/OFF +5V
EVER +5V
TO SELECTOR CIRCUIT
QL11
QL12
CURRENT LIMITER
PL01
1 TADE END LED
2 GND
PL02
1 Vkk (-28V)
2 F(AC 3.6V)
3 F(AC 3.6V)
4 GND
5 EVER +5V
6 POWER ON
7 BACK UP +B
8 AC CLOCK
9 RESET
TO WX04 OF UX02 TIMER 1, DISPLAY CIRCUIT
BACK UP+B REGULATOR
RESET CIRCUIT

9-1. PIF, Selector Block Diagram (V-81/83G)


V: 100mV/div.
H: 20μs/div.
V: 1V/div.
H: 20μs/div.
V: 1V/div.
H: 20μs/div.
INPUT SIGNAL
OUTPUT SIGNAL
RF-OUT
RF-IN
RF SPLITTER
MIXER
RF MOD
H001 TUNER
RF-IN
AGC
IF
VT
LB HB UB AFC
L055 L.S.B. CH. TRAP
L056 U.S.B. CH TRAP
Q001 AMP
Z001 IF FILTER
TP15
Q010, Q017~Q024 Q029
AFC SUPERIMPOSING CIRCUIT
R052 RF AGC
+12V
AGC TIME CONST
IC002 TA7607AP PIF-DET
RF AGC
AGC DET
AGC AMP
LIMITER
BLACK NOISE INVERT
VIDEO DET AMP
WHITE NOISE INVERT
AFC DET
RESO NANCE
RESO NANCE
AFC BAL R051
AFC DEFEAT Q003
Z002 5.5M TRAP
TP12
Q004 BUFFER
VIDEO CIRCUIT
VIDEO OUT
Z003 5.5M B.P.F.
Q025 Q027 MUTE
Q028 BUFFER
IC006 TA7337P SIF-DET
LIMIT
DET
AMP
PHASE SHIFT
Q007 MUTE
AUDIO CIRCUIT
AUDIO OUT
MEMORY (M58659P)
-30V
+5V
VSS
VGG
DATA REG(16bit)
I/O BUFFER
USB ADDRESS DECODER
LSB ADDRESS DECODER
LSB ADDRESS REG.
CLOCK
MEMORY
MODE SELECTION CONTROL CIRCUIT
CS
CLK
CI
C2
C3
I/O
VS (M50430-085SP)
VDD
CLK
CI
C2
C3
AC
CH DATA 1
CH DATA 10
OSC IN
OSC OUT
I/O
CH CLK
CH POSITION DATA
SCAN 0
SCAN 1
LB
HB
UB
SCAN 0
SCAN 1
SCAN 2
SCAN 3
SCAN 4
MUTE
AFC
CS
D/A
TEST
VSS
RESET
4MHz
TUNING
ONE'S DIGIT
10'S DIGIT
CH SET
BAND
"H" MUTE
"L" DEFEAT
ICA02 M58659P
MEMORY
ICA01 M50430-085SP
VS CONTROL
AC
D/A
MUTE
AFC
Q011 ~ Q016
BAND SWITCH CIRCUIT
QA07, DA04
VS RESET
+5V
PRESET KEY MATRIX
QA03 PULSE AMP
+32V
Q008 DEFEAT DRIVE
+12V
QA04 LED DRIVER
+5V
DA02
OSC
4MHz
TO TIMER
DEFEAT SIGNAL DRIVE
PLAY +B
QA05, QA06, DA03
V: 50mV/div.
H: 0.1μs/div.
V: 200mV/div.
H: 0.5ms/div.
CH CLK ⑫
CH POSITION DATA ⑬
≑20 ms
3ms x 8
≑3ms
3ms x 10
ALWAY'S "L"
⑧
CH DATA 10
CH DATA 1 ⑦
TIMER → TRANSFER TO VS
VS → TRANSFER TO TIMER
RX-TX BASIC CYCLE (≑120ms)

Memorys Reading & Writing Polarities

Terminal / Operation Mode	C1	C2	C3
Stand by	H	H	H
Erase	H	L	H
Address input	H	L	L
Reading	L	H	H
Data output	L	H	L
Writing	L	L	H
Data input	L	L	L

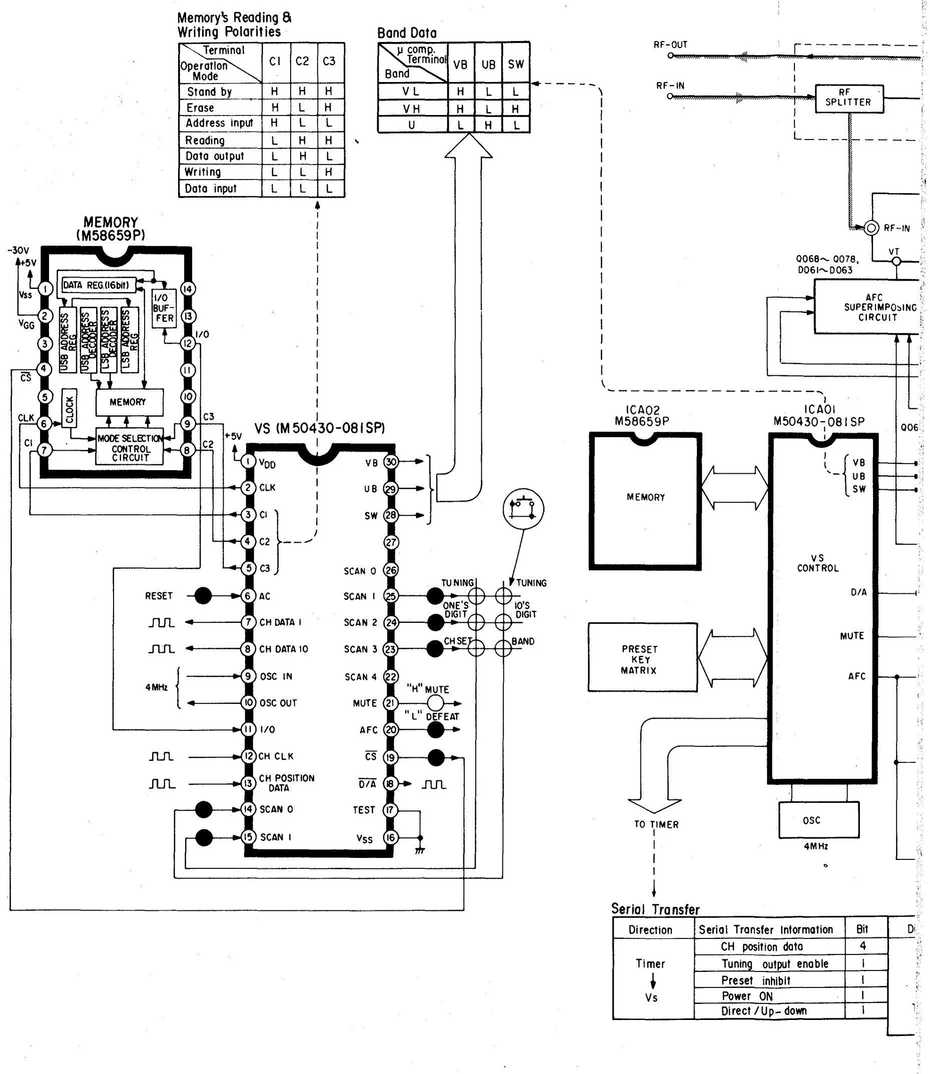
Band Data

μ comp. Terminal / Band	LB	HB	UB
VL	H	L	L
VH	L	H	L
U	L	L	H

Serial Transfer

Direction	Serial Transfer information		Bit
Timer ↓ Vs	CH position data		4
	Tuning output enable		1
	Preset inhibit		1
	Power ON		1
	Direct / Up-down		1
Vs ↓ Timer	Real CH data	One's digit	4
		Ten's digit	4
	CH position data		4
	Band data		2
	Preset data		1
	Tuning voltage data		3

9-2. PIF, Selector Block Diagram (V-81/83W)


RF-OUT
RF-IN
RF SPLITTER
RF-IN
VT
Q068~Q078, D061~D063
AFC SUPERIMPOSING CIRCUIT
MEMORY (M58659P)
-30V
+5V
VSS
VGG
DATA REG(16bit)
I/O BUFFER
CLOCK
MEMORY
MODE SELECTION CONTROL CIRCUIT
CS
CLK
CI
C2
C3
I/O
VS (M50430-081SP)
VDD
CLK
CI
C2
C3
AC
CH DATA 1
CH DATA 10
OSC IN
OSC OUT
I/O
CH CLK
CH POSITION DATA
SCAN 0
SCAN 1
VB
UB
SW
SCAN 0
SCAN 1
SCAN 2
SCAN 3
SCAN 4
MUTE
AFC
CS
D/A
TEST
VSS
RESET
4MHz
TUNING
ONE'S DIGIT
10'S DIGIT
CH SET
BAND
"H" MUTE
"L" DEFEAT
ICA02 M58659P
MEMORY
ICA01 M50430-081SP
VB
UB
SW
VS CONTROL
D/A
MUTE
AFC
PRESET KEY MATRIX
TO TIMER
OSC
4MHz

Memory's Reading & Writing Polarities

Terminal / Operation Mode	C1	C2	C3
Stand by	H	H	H
Erase	H	L	H
Address input	H	L	L
Reading	L	H	H
Data output	L	H	L
Writing	L	L	H
Data input	L	L	L

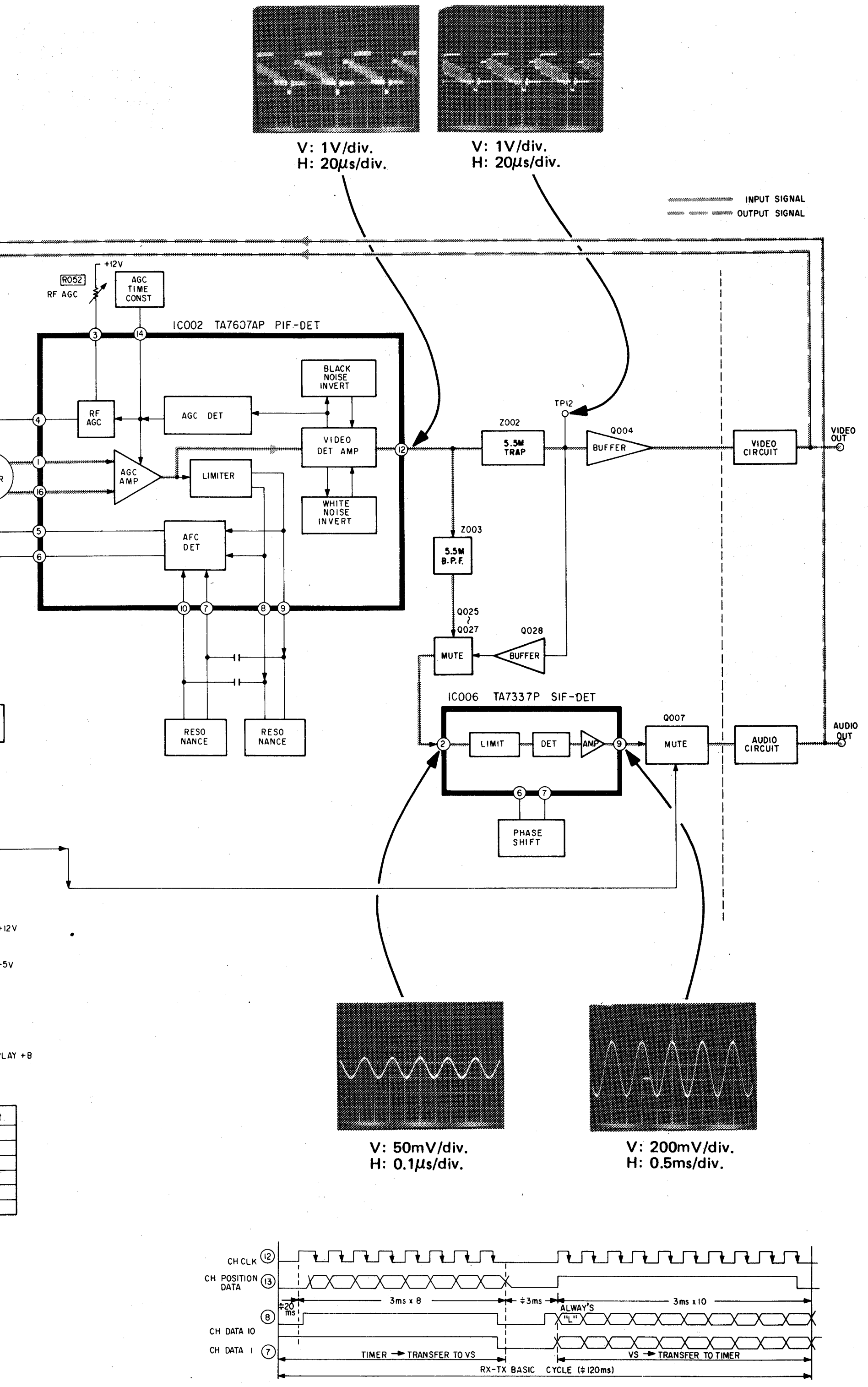
Band Data

μ comp. Terminal / Band	VB	UB	SW
VL	H	L	L
VH	H	L	H
U	L	H	L

Serial Transfer

Direction	Serial Transfer Information	Bit
Timer ↓ Vs	CH position data	4
	Tuning output enable	1
	Preset inhibit	1
	Power ON	1
	Direct / Up-down	1

9-2. PIF, Selector Block Diagram (V-81/83W)

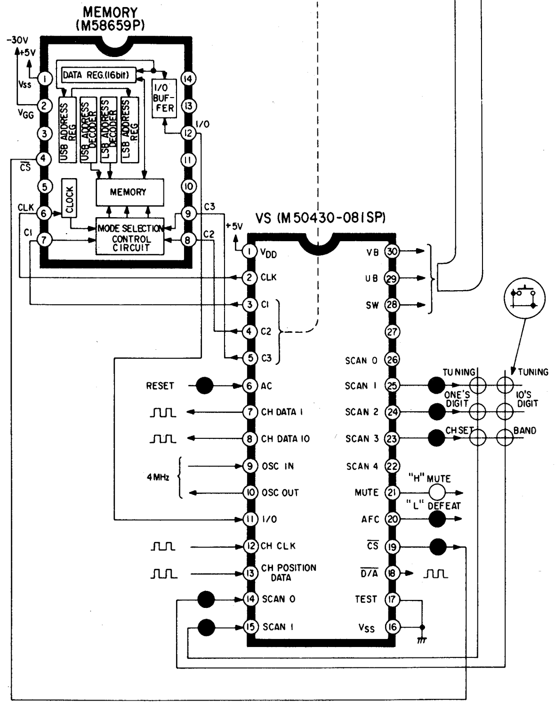

V: 1V/div.
H: 20µs/div.
V: 1V/div.
H: 20µs/div.
INPUT SIGNAL
OUTPUT SIGNAL
+12V
R052
RF AGC
AGC TIME CONST
IC002 TA7607AP PIF-DET
RF AGC
AGC DET
BLACK NOISE INVERT
VIDEO DET AMP
WHITE NOISE INVERT
AGC AMP
LIMITER
AFC DET
RESO NANCE
RESO NANCE
TP12
Z002
5.5M TRAP
Q004
BUFFER
VIDEO CIRCUIT
VIDEO OUT
Z003
5.5M B.P.F.
Q025 / Q027
Q028
BUFFER
MUTE
IC006 TA7337P SIF-DET
LIMIT
DET
AMP
PHASE SHIFT
Q007
MUTE
AUDIO CIRCUIT
AUDIO OUT
+12V
+5V
LAY +8
V: 50mV/div.
H: 0.1µs/div.
V: 200mV/div.
H: 0.5ms/div.
CH CLK ⑫
CH POSITION DATA ⑬
⑧
CH DATA 10
CH DATA 1 ⑦
≑20 ms
3ms x 8
≑3ms
3ms x 10
ALWAY'S "L"
TIMER → TRANSFER TO VS
VS → TRANSFER TO TIMER
RX-TX BASIC CYCLE (≑120ms)

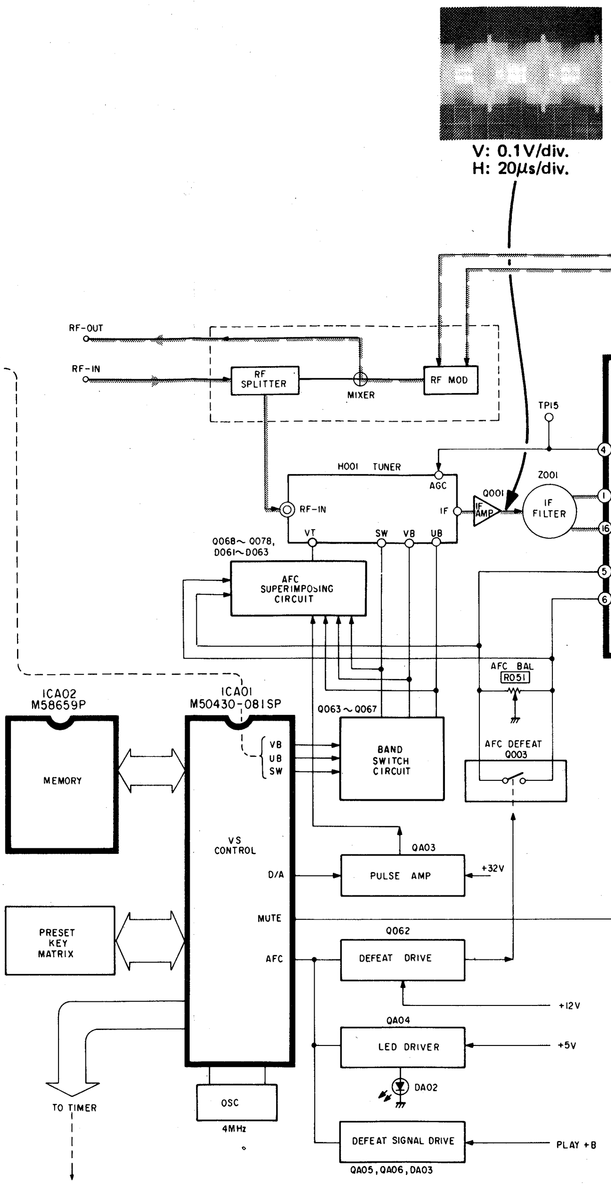
Memory's Reading & Writing Polarities

Terminal / Operation Mode	C1	C2	C3
Stand by	H	H	H
Erase	H	L	H
Address input	H	L	L
Reading	L	H	H
Data output	L	H	L
Writing	L	L	H
Data input	L	L	L

Band Data

µ comp. Terminal / Band	VB	UB	SW
VL	H	L	L
VH	H	L	H
U	L	H	L

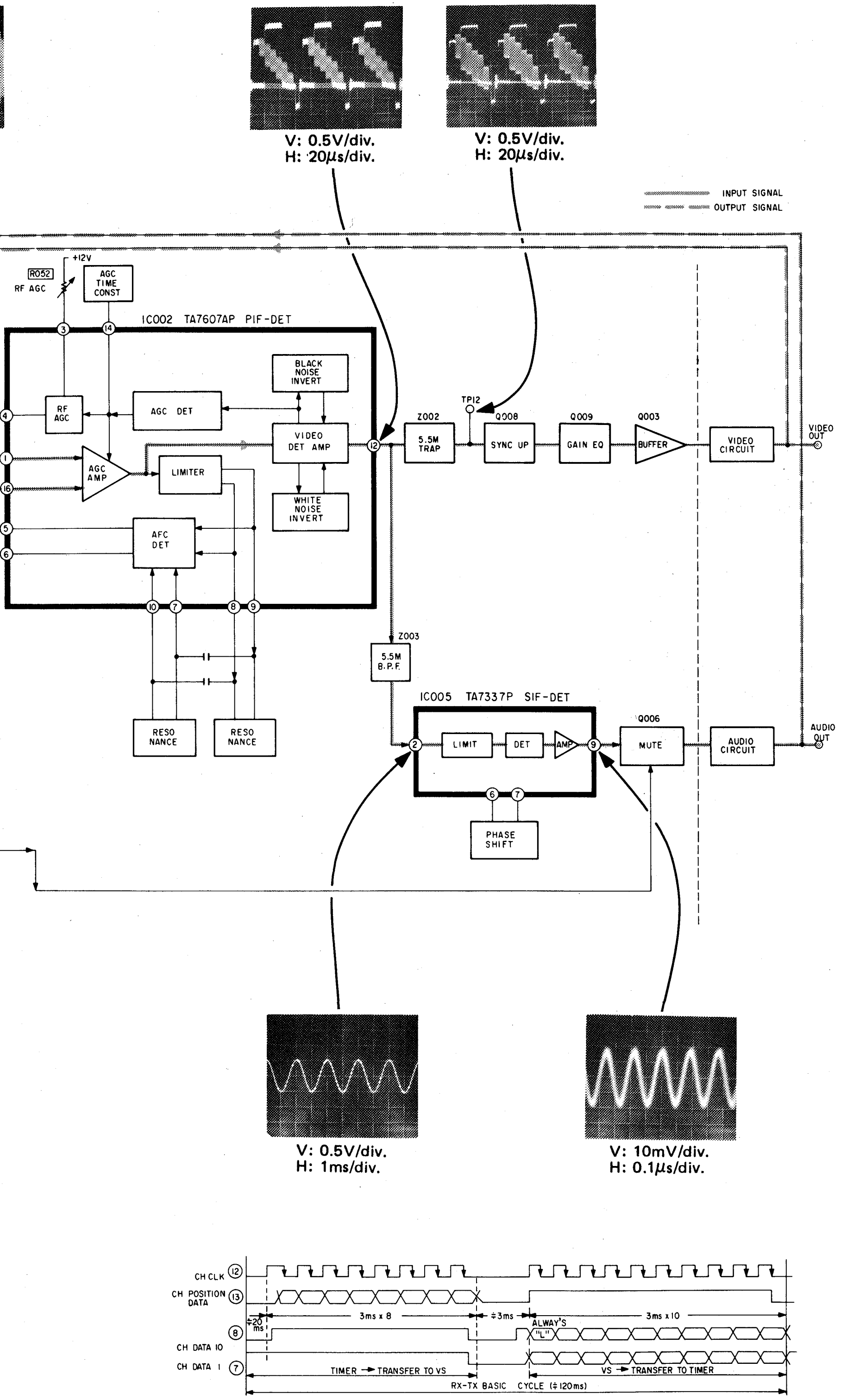

MEMORY
(M58659P)
-30V
+5V
Vss
VGG
CS
CLK
C1
DATA REG.(16bit)
I/O BUFFER
USB ADDRESS REG
USB ADDRESS DECODER
LSB ADDRESS DECODER
LSB ADDRESS REG
MEMORY
CLOCK
MODE SELECTION CONTROL CIRCUIT
I/O
C3
C2
+5V
VS (M50430-081SP)
VDD
CLK
C1
C2
C3
RESET
AC
CH DATA 1
CH DATA 10
4MHz
OSC IN
OSC OUT
I/O
CH CLK
CH POSITION DATA
SCAN 0
SCAN 1
VB
UB
SW
SCAN 0
SCAN 1
SCAN 2
SCAN 3
SCAN 4
MUTE
AFC
CS
D/A
TEST
Vss
TUNING
ONE'S DIGIT
TUNING
10'S DIGIT
CH SET
BAND
"H" MUTE
"L" DEFEAT


V: 0.1V/div.
H: 20µs/div.
RF-OUT
RF-IN
RF SPLITTER
MIXER
RF MOD
TP15
H001 TUNER
RF-IN
AGC
IF
VT
SW
VB
UB
Q001
IF AMP
Z001
IF FILTER
Q068～Q078, D061～D063
AFC SUPERIMPOSING CIRCUIT
AFC BAL
R051
AFC DEFEAT
Q003
ICA02
M58659P
MEMORY
ICA01
M50430-081SP
VS CONTROL
VB
UB
SW
D/A
MUTE
AFC
Q063～Q067
BAND SWITCH CIRCUIT
QA03
PULSE AMP
+32V
Q062
DEFEAT DRIVE
+12V
QA04
LED DRIVER
+5V
DA02
DEFEAT SIGNAL DRIVE
PLAY +B
QA05, QA06, DA03
PRESET KEY MATRIX
TO TIMER
OSC
4MHz

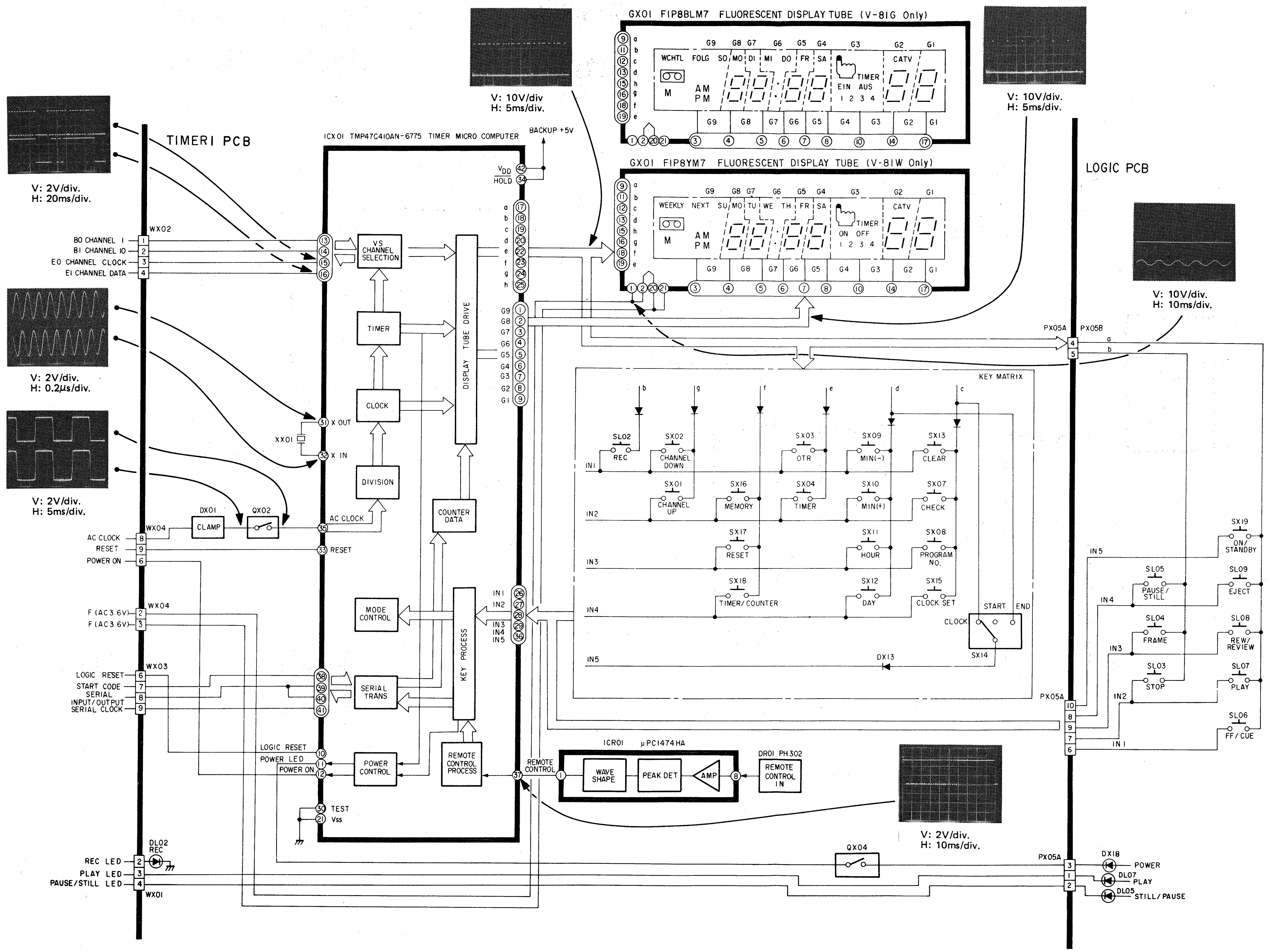
Serial Transfer

Direction	Serial Transfer Information	Bit
Timer ↓ Vs	CH position data	4
	Tuning output enable	1
	Preset inhibit	1
	Power ON	1
	Direct / Up-down	1

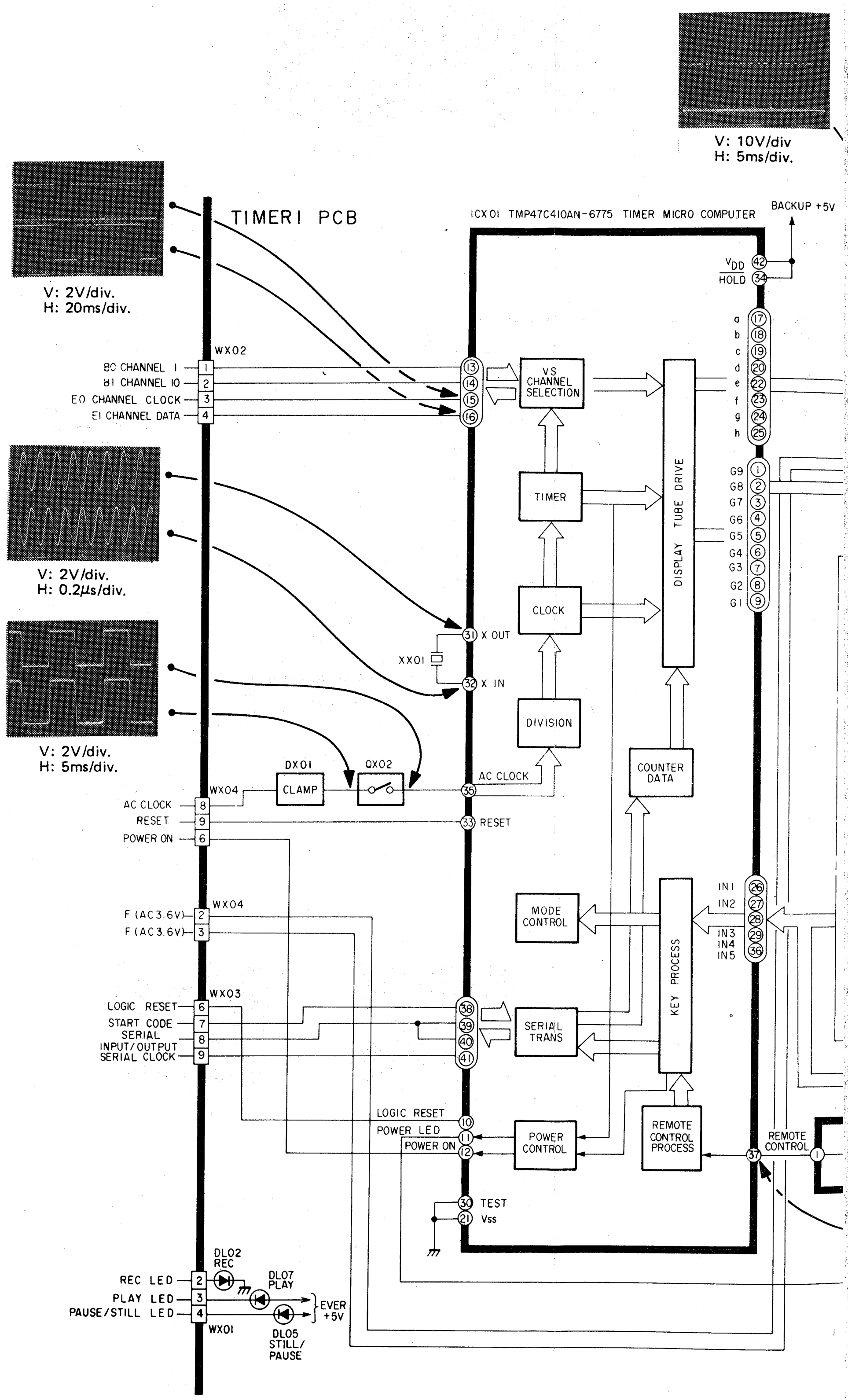
Direction	Serial Transfer Information		Bit
Vs ↓ Timer	Real CH data	One's digit	4
		Ten's digit	4
	CH position data		4
	Band data		2
	Preset data		1
	Tuning voltage data		3


V: 0.5V/div.
H: 20µs/div.
V: 0.5V/div.
H: 20µs/div.
INPUT SIGNAL
OUTPUT SIGNAL
+12V
R052
RF AGC
AGC TIME CONST
IC002 TA7607AP PIF-DET
RF AGC
AGC DET
BLACK NOISE INVERT
VIDEO DET AMP
WHITE NOISE INVERT
AGC AMP
LIMITER
AFC DET
RESO NANCE
RESO NANCE
TP12
Z002
5.5M TRAP
Q008
SYNC UP
Q009
GAIN EQ
Q003
BUFFER
VIDEO CIRCUIT
VIDEO OUT
Z003
5.5M B.P.F.
IC005 TA7337P SIF-DET
LIMIT
DET
AMP
PHASE SHIFT
Q006
MUTE
AUDIO CIRCUIT
AUDIO OUT
V: 0.5V/div.
H: 1ms/div.
V: 10mV/div.
H: 0.1µs/div.
CH CLK ⑫
CH POSITION DATA ⑬
⑧
CH DATA 10
CH DATA 1 ⑦
≑20 ms
3ms x 8
≑3ms
3ms x 10
ALWAY'S "L"
TIMER → TRANSFER TO VS
VS → TRANSFER TO TIMER
RX-TX BASIC CYCLE (≑120ms)

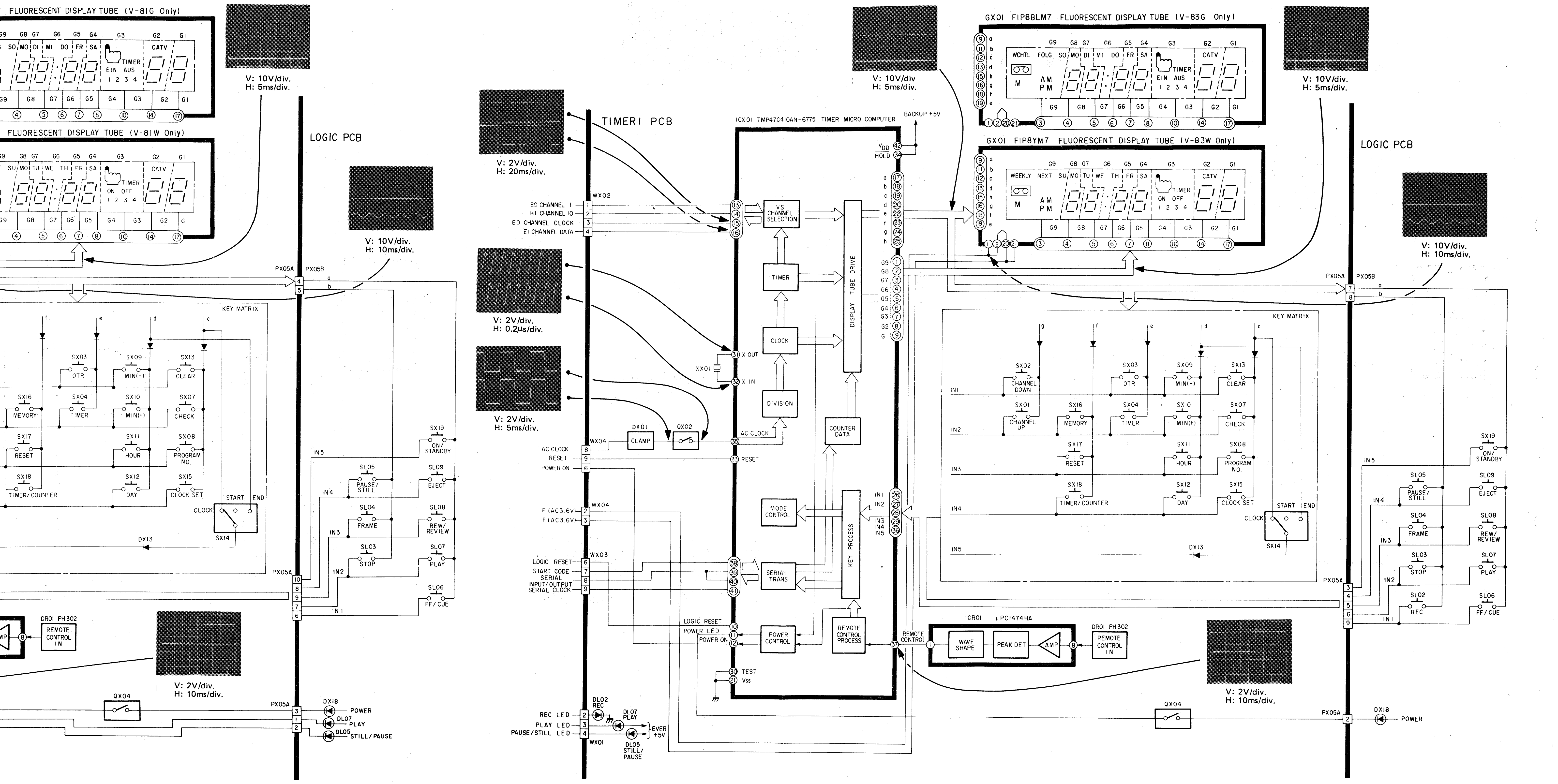
10-1. Timer 1, Display Block Diagram (V-81G/W)

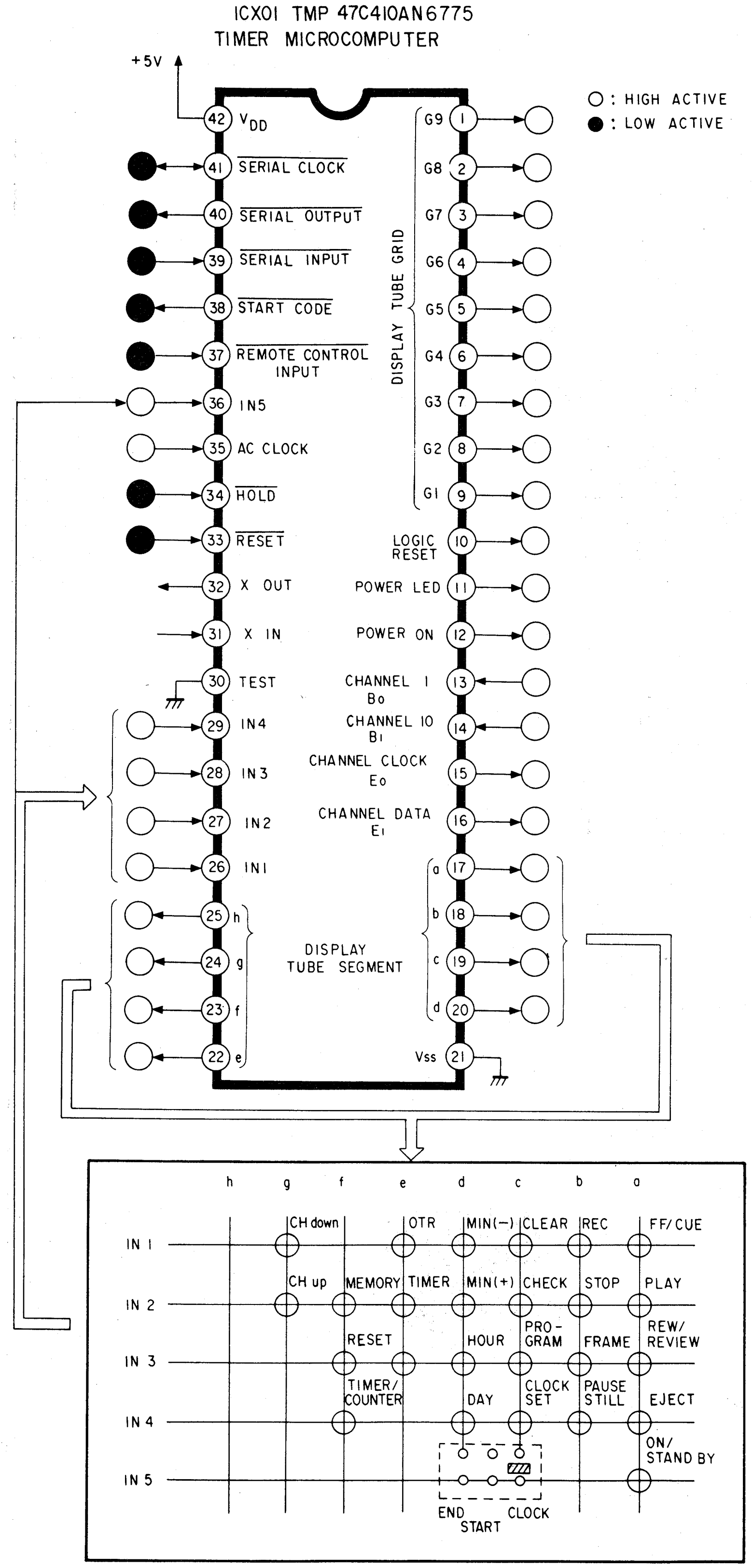

V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 0.2µs/div.
V: 2V/div.
H: 5ms/div.
V: 10V/div
H: 5ms/div.
V: 10V/div.
H: 5ms/div.
V: 10V/div.
H: 10ms/div.
V: 2V/div.
H: 10ms/div.
TIMER1 PCB
LOGIC PCB
WX02
B0 CHANNEL 1
B1 CHANNEL 10
E0 CHANNEL CLOCK
E1 CHANNEL DATA
ICX01 TMP47C410AN-6775 TIMER MICRO COMPUTER
BACKUP +5V
VDD
HOLD
V.S CHANNEL SELECTION
TIMER
CLOCK
DIVISION
DISPLAY TUBE DRIVE
COUNTER DATA
KEY PROCESS
MODE CONTROL
SERIAL TRANS
POWER CONTROL
REMOTE CONTROL PROCESS
X OUT
X IN
XX01
DX01
CLAMP
QX02
AC CLOCK
RESET
WX04
AC CLOCK
RESET
POWER ON
F (AC 3.6V)
F (AC 3.6V)
WX03
LOGIC RESET
START CODE
SERIAL INPUT/OUTPUT
SERIAL CLOCK
LOGIC RESET
POWER LED
POWER ON
TEST
Vss
IN1
IN2
IN3
IN4
IN5
REMOTE CONTROL
ICR01 µPC1474HA
WAVE SHAPE
PEAK DET
AMP
DR01 PH302
REMOTE CONTROL IN
DL02
REC
REC LED
PLAY LED
PAUSE/STILL LED
WX01
QX04
GX01 FIP8BLM7 FLUORESCENT DISPLAY TUBE (V-81G Only)
WCHTL FOLG SO MO DI MI DO FR SA
TIMER
EIN AUS
CATV
AM PM
GX01 FIP8YM7 FLUORESCENT DISPLAY TUBE (V-81W Only)
WEEKLY NEXT SU MO TU WE TH FR SA
ON OFF
G9 G8 G7 G6 G5 G4 G3 G2 G1
PX05A PX05B
KEY MATRIX
SL02 REC
SX02 CHANNEL DOWN
SX03 OTR
SX09 MIN(−)
SX13 CLEAR
SX01 CHANNEL UP
SX16 MEMORY
SX04 TIMER
SX10 MIN(+)
SX07 CHECK
SX17 RESET
SX11 HOUR
SX08 PROGRAM NO.
SX18 TIMER/COUNTER
SX12 DAY
SX15 CLOCK SET
START END
CLOCK
SX14
DX13
SX19 ON/STANDBY
SL05 PAUSE/STILL
SL09 EJECT
SL04 FRAME
SL08 REW/REVIEW
SL03 STOP
SL07 PLAY
SL06 FF/CUE
DX18 POWER
DL07 PLAY
DL05 STILL/PAUSE

10-2. Timer 1, Display Block Diagram (V-83G/W


V: 10V/div
H: 5ms/div.
V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 0.2µs/div.
V: 2V/div.
H: 5ms/div.
TIMER1 PCB
ICX01 TMP47C410AN-6775 TIMER MICRO COMPUTER
BACKUP +5V
WX02
B0 CHANNEL 1
B1 CHANNEL 10
E0 CHANNEL CLOCK
E1 CHANNEL DATA
V.S CHANNEL SELECTION
TIMER
CLOCK
DIVISION
DISPLAY TUBE DRIVE
COUNTER DATA
KEY PROCESS
MODE CONTROL
SERIAL TRANS
POWER CONTROL
REMOTE CONTROL PROCESS
REMOTE CONTROL
X OUT
X IN
XX01
DX01
CLAMP
QX02
AC CLOCK
RESET
WX04
AC CLOCK
RESET
POWER ON
F (AC 3.6V)
F (AC 3.6V)
WX03
LOGIC RESET
START CODE
SERIAL INPUT/OUTPUT
SERIAL CLOCK
LOGIC RESET
POWER LED
POWER ON
TEST
Vss
IN1 IN2 IN3 IN4 IN5
DL02 REC
DL07 PLAY
EVER +5V
DL05 STILL/PAUSE
REC LED
PLAY LED
PAUSE/STILL LED
WX01

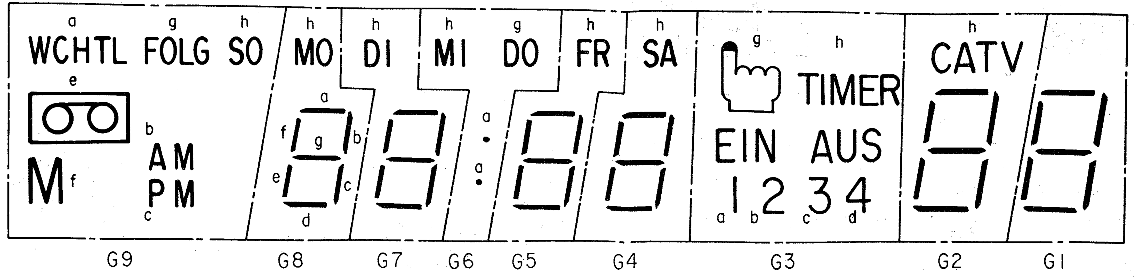
10-2. Timer 1, Display Block Diagram (V-83G/W)


FLUORESCENT DISPLAY TUBE (V-81G Only)
SO MO DI MI DO FR SA TIMER EIN AUS 1 2 3 4 CATV
FLUORESCENT DISPLAY TUBE (V-81W Only)
SU MO TU WE TH FR SA TIMER ON OFF 1 2 3 4 CATV
G9 G8 G7 G6 G5 G4 G3 G2 G1
V: 10V/div.
H: 5ms/div.
LOGIC PCB
V: 10V/div.
H: 10ms/div.
PX05A PX05B
KEY MATRIX
SX03 OTR
SX09 MIN(−)
SX13 CLEAR
SX16 MEMORY
SX04 TIMER
SX10 MIN(+)
SX07 CHECK
SX17 RESET
SX11 HOUR
SX08 PROGRAM NO.
SX18 TIMER/COUNTER
SX12 DAY
SX15 CLOCK SET
START END
CLOCK
SX14
DX13
SX19 ON/STANDBY
SL05 PAUSE/STILL
SL09 EJECT
SL04 FRAME
SL08 REW/REVIEW
SL03 STOP
SL07 PLAY
SL06 FF/CUE
IN1 IN2 IN3 IN4 IN5
DR01 PH302
REMOTE CONTROL IN
V: 2V/div.
H: 10ms/div.
QX04
DX18 POWER
DL07 PLAY
DL05 STILL/PAUSE
V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 0.2µs/div.
V: 2V/div.
H: 5ms/div.
TIMER1 PCB
ICX01 TMP47C410AN-6775 TIMER MICRO COMPUTER
BACKUP +5V
VDD
HOLD
WX02
BC CHANNEL I
BI CHANNEL IO
EO CHANNEL CLOCK
EI CHANNEL DATA
VS CHANNEL SELECTION
TIMER
CLOCK
DIVISION
DISPLAY TUBE DRIVE
COUNTER DATA
MODE CONTROL
KEY PROCESS
SERIAL TRANS
POWER CONTROL
REMOTE CONTROL PROCESS
X OUT
X IN
XX01
DX01 CLAMP
QX02
AC CLOCK
RESET
POWER ON
WX04
F (AC3.6V)
WX03
LOGIC RESET
START CODE
SERIAL INPUT/OUTPUT
SERIAL CLOCK
POWER LED
TEST
Vss
REMOTE CONTROL
REC LED
PLAY LED
PAUSE/STILL LED
WX01
DL02 REC
DL07 PLAY
DL05 STILL/PAUSE
EVER +5V
V: 10V/div.
H: 5ms/div.
GX01 FIP8BLM7 FLUORESCENT DISPLAY TUBE (V-83G Only)
WCHTL FOLG SO MO DI MI DO FR SA TIMER EIN AUS 1 2 3 4 CATV AM PM
GX01 FIP8YM7 FLUORESCENT DISPLAY TUBE (V-83W Only)
WEEKLY NEXT SU MO TU WE TH FR SA TIMER ON OFF 1 2 3 4 CATV AM PM
V: 10V/div.
H: 5ms/div.
LOGIC PCB
V: 10V/div.
H: 10ms/div.
SX02 CHANNEL DOWN
SX01 CHANNEL UP
SL02 REC
ICR01 µPC1474HA
WAVE SHAPE
PEAK DET
AMP
DR01 PH302
REMOTE CONTROL IN
V: 2V/div.
H: 10ms/div.
QX04
DX18 POWER


ICX01 TMP 47C410AN6775
TIMER MICROCOMPUTER
+5V
○ : HIGH ACTIVE
● : LOW ACTIVE
VDD
SERIAL CLOCK
SERIAL OUTPUT
SERIAL INPUT
START CODE
REMOTE CONTROL INPUT
IN5
AC CLOCK
HOLD
RESET
X OUT
X IN
TEST
IN4
IN3
IN2
IN1
DISPLAY TUBE GRID
G9
G8
G7
G6
G5
G4
G3
G2
G1
LOGIC RESET
POWER LED
POWER ON
CHANNEL 1 B0
CHANNEL 10 B1
CHANNEL CLOCK E0
CHANNEL DATA E1
DISPLAY TUBE SEGMENT
Vss
h g f e d c b a
IN 1
IN 2
IN 3
IN 4
IN 5
CH down
OTR
MIN(−)
CLEAR
REC
FF/CUE
CH up
MEMORY
TIMER
MIN(+)
CHECK
STOP
PLAY
RESET
HOUR
PRO-GRAM
FRAME
REW/REVIEW
TIMER/COUNTER
DAY
CLOCK SET
PAUSE STILL
EJECT
ON/STAND BY
END
START
CLOCK

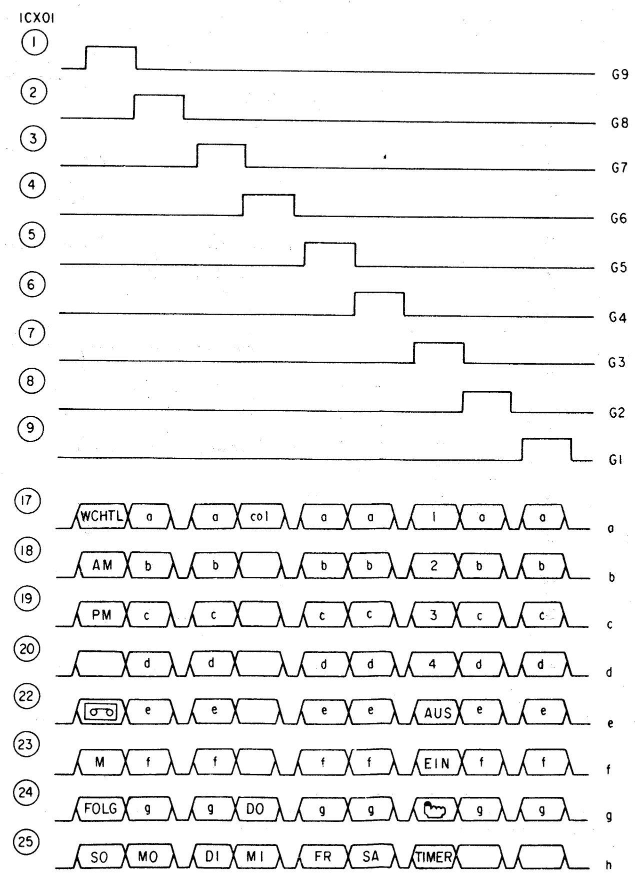
V-81/83G

GX01 FIP8BLM7


WCHTL
FOLG
SO
MO
DI
MI
DO
FR
SA
TIMER
CATV
EIN
AUS
1 2 3 4
AM
PM
M
G9
G8
G7
G6
G5
G4
G3
G2
G1

Display Pattern

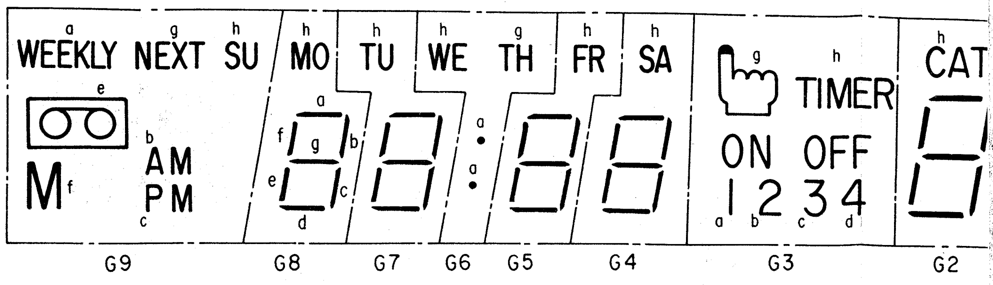
Seg	Grid								
	G_1	G_2	G_3	G_4	G_5	G_6	G_7	G_8	G_9
a	a	a	1	a	a	:	a	a	WCHTL
b	b	b	2	b	b		b	b	
c	c	c	3	c	c		c	c	
d	d	d	4	d	d		d	d	
e	e	e	AUS	e	e		e	e	📼
f	f	f	EIN	f	f		f	f	M
g	g	g	☞	g	g	DO	g	g	FOLG
h			TIMER	SA	FR	MI	DI	MO	SO



* The time chart shows outputs for the display tube only and outputs for the key scanning are omitted.

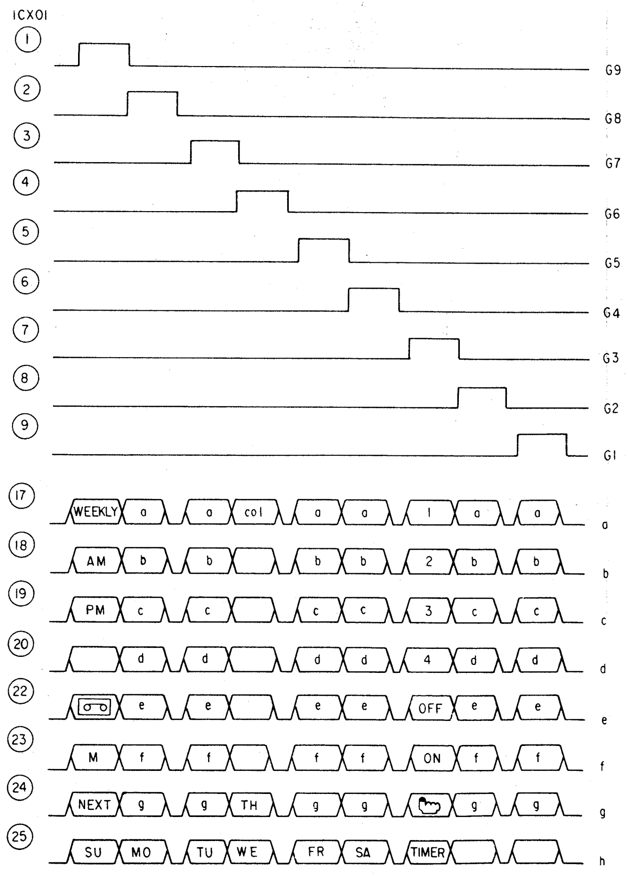
V-81/83W

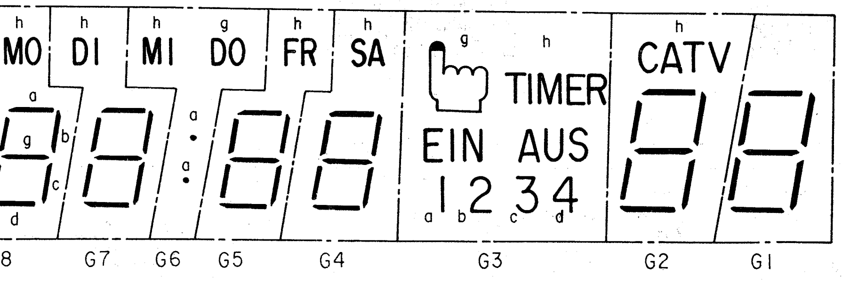
GX01 FIP8YM7


WEEKLY
NEXT
SU
MO
TU
WE
TH
FR
SA
TIMER
CAT
ON
OFF
1 2 3 4
AM
PM
M
G9
G8
G7
G6
G5
G4
G3
G2

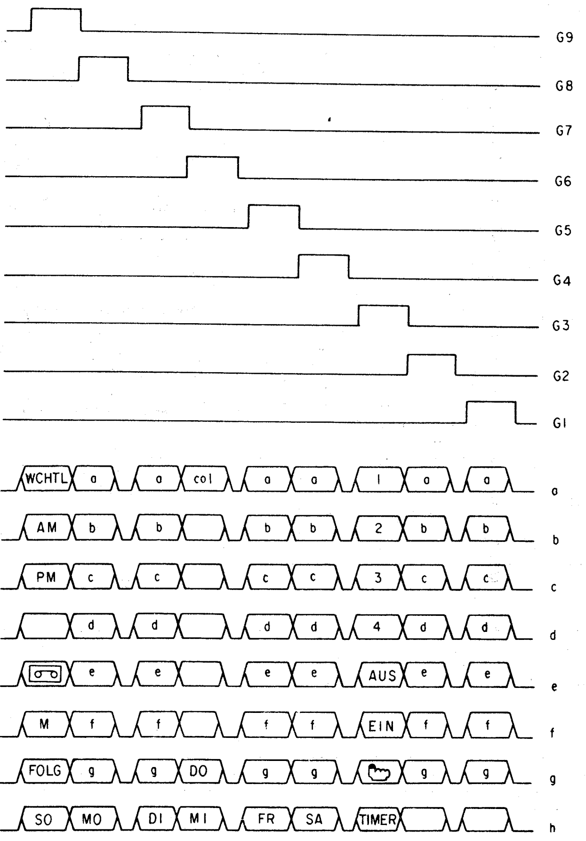
Display Pattern

Seg	Grid							
	G_1	G_2	G_3	G_4	G_5	G_6	G_7	G_8
a	a	a	1	a	a	:	a	a
b	b	b	2	b	b		b	b
c	c	c	3	c	c		c	c
d	d	d	4	d	d		d	d
e	e	e	OFF	e	e		e	e
f	f	f	ON	f	f		f	f
g	g	g	☞	g	g	TH	g	g
h			TIMER	SA	FR	WE	TU	MO




MO DI MI DO FR SA
TIMER
CATV
EIN AUS
1 2 3 4
G7 G6 G5 G4 G3 G2 G1

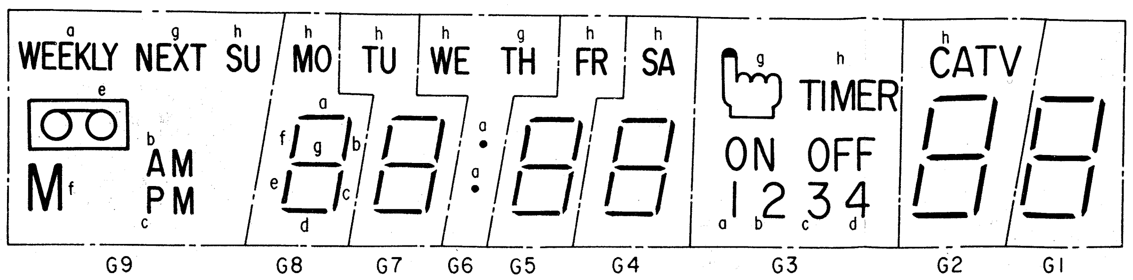
	Grid						
	G3	G4	G5	G6	G7	G8	G9
	1	a	a	:	a	a	WCHTL
	2	b	b		b	b	
	3	c	c		c	c	
	4	d	d		d	d	
	AUS	e	e		e	e	📼
	EIN	f	f		f	f	M
	☝	g	g	DO	g	g	FOLG
	TIMER	SA	FR	MI	DI	MO	SO



* The time chart shows outputs for the display tube only and outputs for the key scanning are omitted.

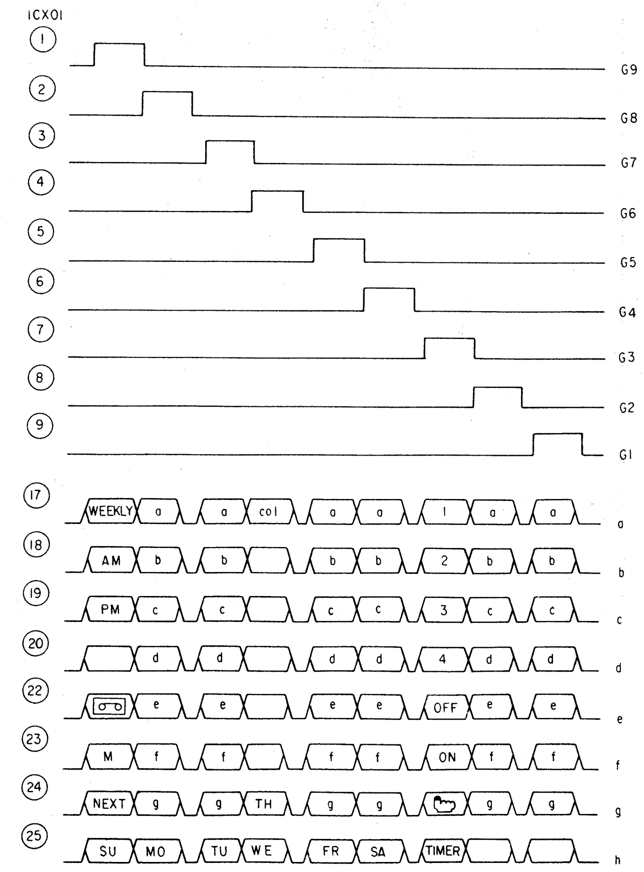
V-81/83W

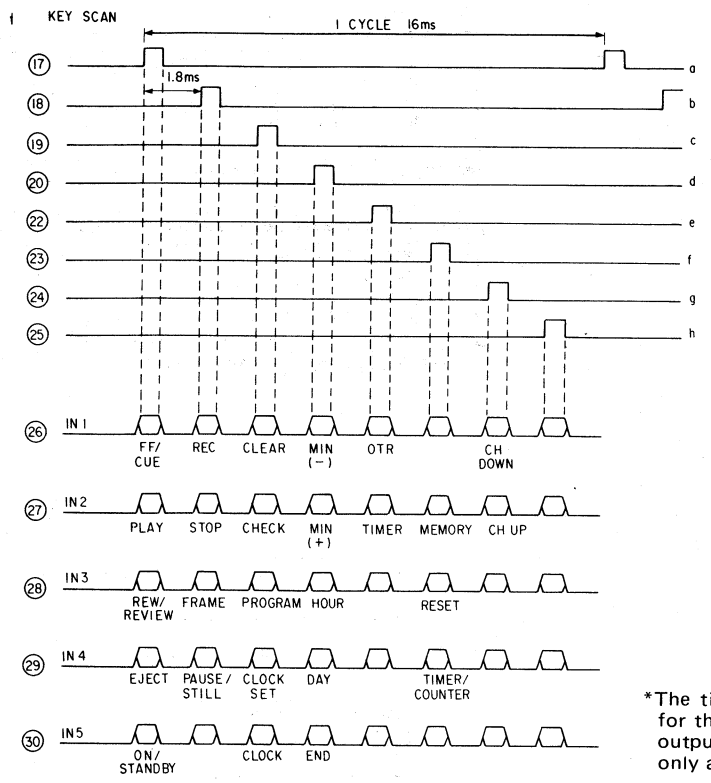
GX01 FIP8YM7


WEEKLY NEXT SU MO TU WE TH FR SA
TIMER
CATV
AM
PM
M
ON OFF
1 2 3 4
G9 G8 G7 G6 G5 G4 G3 G2 G1

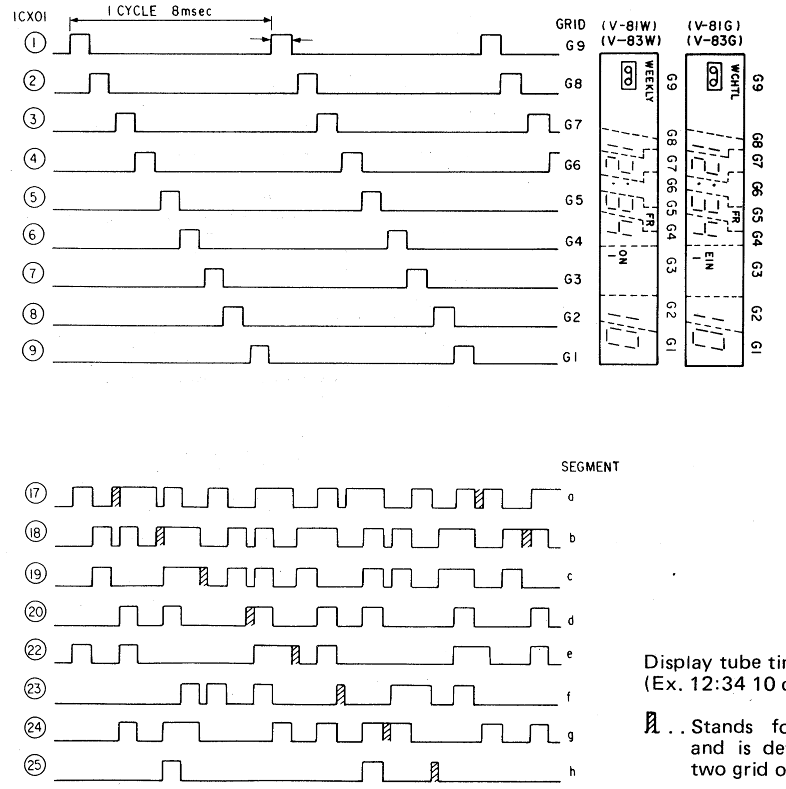
Display Pattern

Seg	Grid								
	G1	G2	G3	G4	G5	G6	G7	G8	G9
a	a	a	1	a	a	:	a	a	WEEKLY
b	b	b	2	b	b		b	b	
c	c	c	3	c	c		c	c	
d	d	d	4	d	d		d	d	
e	e	e	OFF	e	e		e	e	📼
f	f	f	ON	f	f		f	f	M
g	g	g	☝	g	g	TH	g	g	NEXT
h			TIMER	SA	FR	WE	TU	MO	SU





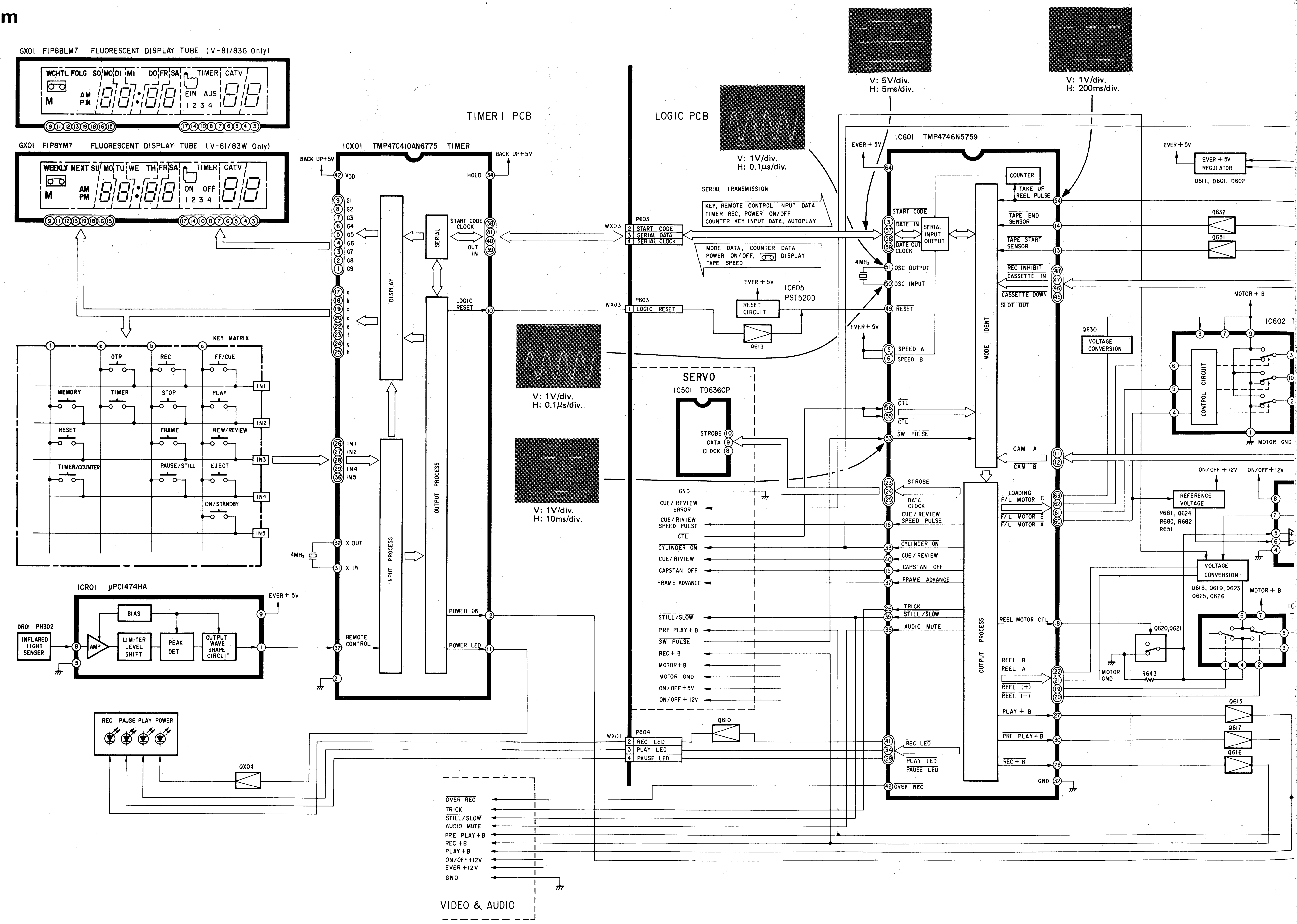
*The time chart shows outputs for the key scanning only and outputs for the display tube only are omitted.

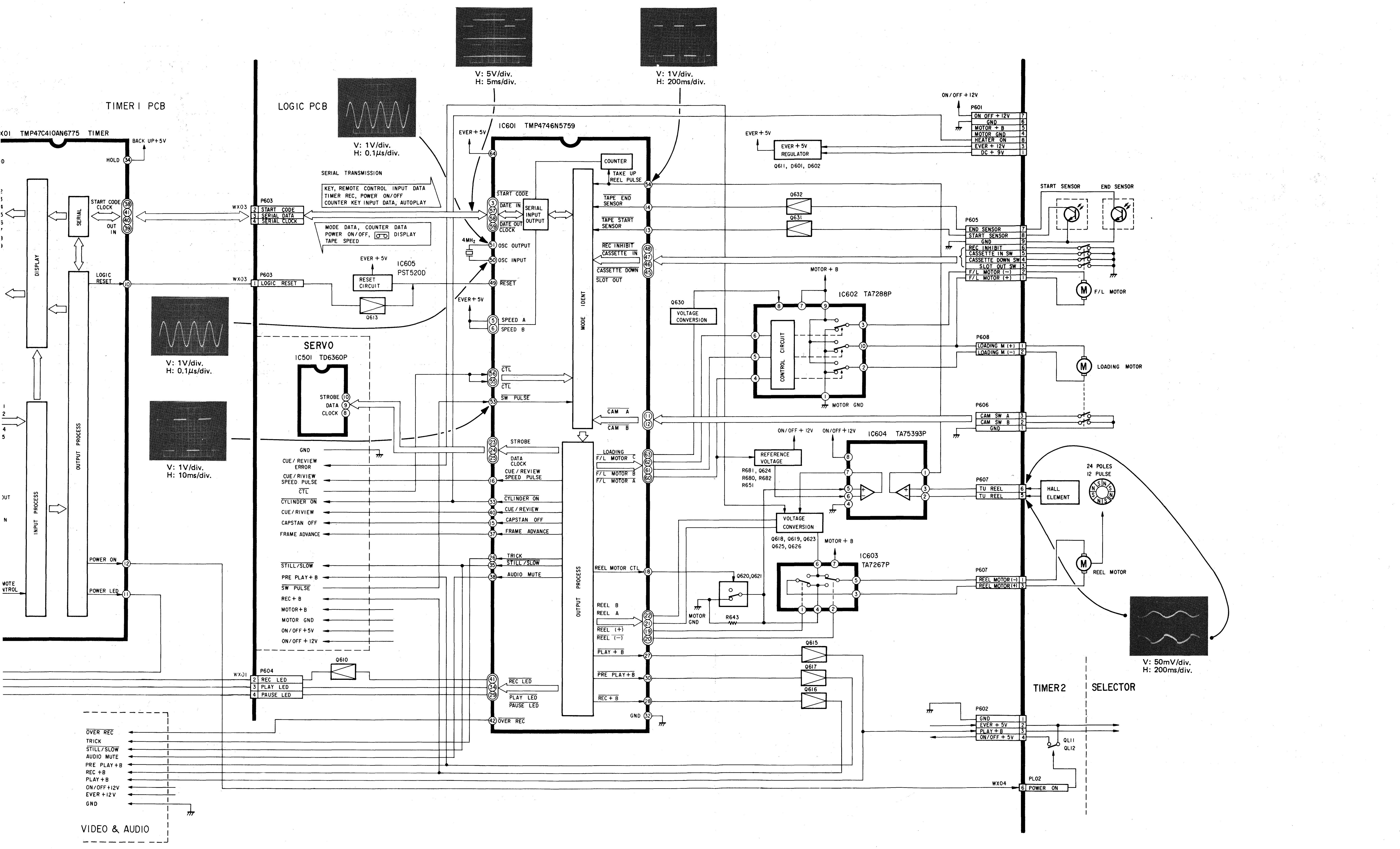


Display tube timing chart
(Ex. 12:34 10 ch)

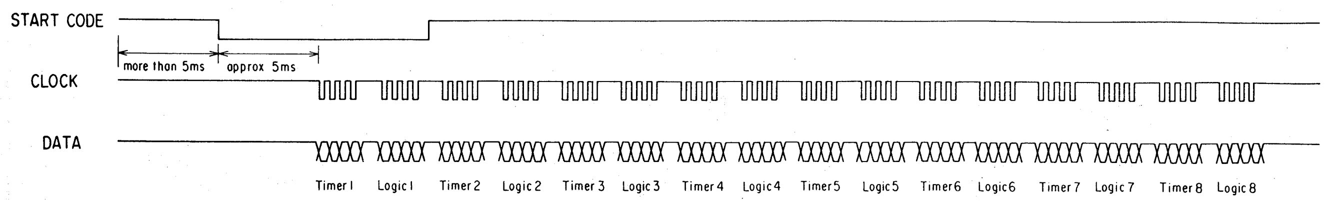
▨ . . Stands for key scanning and is developed at every two grid outputs.

11-1. Logic Block Diagram


GX01 FIP8BLM7 FLUORESCENT DISPLAY TUBE (V-81/83G Only)
WCHTL FOLG SO MO DI MI DO FR SA TIMER CATV
AM PM EIN AUS 1 2 3 4
GX01 FIP8YM7 FLUORESCENT DISPLAY TUBE (V-81/83W Only)
WEEKLY NEXT SU MO TU WE TH FR SA TIMER CATV
AM PM ON OFF 1 2 3 4
KEY MATRIX
OTR
REC
FF/CUE
MEMORY
TIMER
STOP
PLAY
RESET
FRAME
REW/REVIEW
TIMER/COUNTER
PAUSE/STILL
EJECT
ON/STANDBY
IN1
IN2
IN3
IN4
IN5
ICR01 μPC1474HA
BIAS
AMP
LIMITER LEVEL SHIFT
PEAK DET
OUTPUT WAVE SHAPE CIRCUIT
EVER + 5V
DR01 PH302
INFLARED LIGHT SENSER
REC PAUSE PLAY POWER
QX04
TIMER PCB
ICX01 TMP47C410AN6775 TIMER
BACK UP+5V
VDD
G1 G2 G3 G4 G5 G6 G7 G8 G9
a b c d e f g h
HOLD
START CODE CLOCK
OUT IN
SERIAL
DISPLAY
LOGIC RESET
INPUT PROCESS
OUTPUT PROCESS
IN1 IN2 IN4 IN5
4MHz
X OUT
X IN
REMOTE CONTROL
POWER ON
POWER LED
LOGIC PCB
V: 1V/div.
H: 0.1μs/div.
V: 5V/div.
H: 5ms/div.
V: 1V/div.
H: 200ms/div.
V: 1V/div.
H: 0.1μs/div.
V: 1V/div.
H: 10ms/div.
WX03
P603
START CODE
SERIAL DATA
SERIAL CLOCK
SERIAL TRANSMISSION
KEY, REMOTE CONTROL INPUT DATA
TIMER REC, POWER ON/OFF
COUNTER KEY INPUT DATA, AUTOPLAY
MODE DATA, COUNTER DATA
POWER ON/OFF, DISPLAY
TAPE SPEED
LOGIC RESET
EVER + 5V
RESET CIRCUIT
IC605 PST520D
Q613
SERVO
IC501 TD6360P
STROBE
DATA
CLOCK
GND
CUE/REVIEW ERROR
CUE/REVIEW SPEED PULSE
CTL
CYLINDER ON
CUE/RIVIEW
CAPSTAN OFF
FRAME ADVANCE
STILL/SLOW
PRE PLAY + B
SW PULSE
REC + B
MOTOR + B
MOTOR GND
ON/OFF + 5V
ON/OFF + 12V
WX01
P604
REC LED
PLAY LED
PAUSE LED
Q610
OVER REC
TRICK
STILL/SLOW
AUDIO MUTE
PRE PLAY + B
REC + B
PLAY + B
ON/OFF + 12V
EVER + 12V
GND
VIDEO & AUDIO
IC601 TMP4746N5759
COUNTER
TAKE UP REEL PULSE
START CODE
DATE IN
DATE OUT CLOCK
SERIAL INPUT OUTPUT
4MHz
OSC OUTPUT
OSC INPUT
RESET
SPEED A
SPEED B
CTL
CTL
SW PULSE
MODE IDENT
TAPE END SENSOR
TAPE START SENSOR
REC INHIBIT
CASSETTE IN
CASSETTE DOWN
SLOT OUT
CAM A
CAM B
STROBE
DATA CLOCK
CUE/REVIEW SPEED PULSE
LOADING
F/L MOTOR C
F/L MOTOR B
F/L MOTOR A
CYLINDER ON
CUE/REVIEW
CAPSTAN OFF
FRAME ADVANCE
TRICK
STILL/SLOW
AUDIO MUTE
OUTPUT PROCESS
REEL MOTOR CTL
REEL B
REEL A
REEL (+)
REEL (−)
PLAY + B
PRE PLAY + B
REC + B
GND
REC LED
PLAY LED
PAUSE LED
OVER REC
EVER + 5V REGULATOR
Q611, D601, D602
Q632
Q631
MOTOR + B
IC602
Q630
VOLTAGE CONVERSION
CONTROL CIRCUIT
MOTOR GND
ON/OFF + 12V
REFERENCE VOLTAGE
R681, Q624
R680, R682
R651
VOLTAGE CONVERSION
Q618, Q619, Q623
Q625, Q626
MOTOR + B
Q620, Q621
MOTOR GND
R643
Q615
Q617
Q616


TIMER I PCB
LOGIC PCB
K01 TMP47C410AN6775 TIMER
BACK UP+5V
HOLD 34
START CODE
CLOCK
OUT
IN
38 41 40 39
SERIAL
DISPLAY
LOGIC RESET 10
OUTPUT PROCESS
INPUT PROCESS
POWER ON 12
POWER LED 11
MOTE
NTROL
UT
N
V: 1V/div.
H: 0.1μs/div.
V: 1V/div.
H: 0.1μs/div.
V: 1V/div.
H: 10ms/div.
V: 5V/div.
H: 5ms/div.
V: 1V/div.
H: 200ms/div.
V: 50mV/div.
H: 200ms/div.
SERIAL TRANSMISSION
KEY, REMOTE CONTROL INPUT DATA
TIMER REC, POWER ON/OFF
COUNTER KEY INPUT DATA, AUTOPLAY
MODE DATA, COUNTER DATA
POWER ON/OFF, DISPLAY
TAPE SPEED
WX03
P603
2 START CODE
3 SERIAL DATA
4 SERIAL CLOCK
1 LOGIC RESET
EVER + 5V
IC605
PST520D
RESET CIRCUIT
Q613
4MHz
SERVO
IC501 TD6360P
STROBE 10
DATA 9
CLOCK 8
IC601 TMP4746N5759
EVER + 5V 64
START CODE
DATE IN
DATE OUT
CLOCK
3 57 58 59
SERIAL INPUT OUTPUT
51 OSC OUTPUT
50 OSC INPUT
49 RESET
5 SPEED A
6 SPEED B
56 55 CTL
53 SW PULSE
23 24 25 STROBE DATA CLOCK
MODE IDENT
OUTPUT PROCESS
COUNTER
TAKE UP REEL PULSE 54
TAPE END SENSOR 14
TAPE START SENSOR 13
REC INHIBIT 48
CASSETTE IN 47
CASSETTE DOWN 46
SLOT OUT 45
CAM A 11
CAM B 12
LOADING
F/L MOTOR C 63
F/L MOTOR B 62
F/L MOTOR A 61 60
GND
CUE/REVIEW ERROR
CUE/RIVIEW SPEED PULSE
CTL
CYLINDER ON
CUE/RIVIEW
CAPSTAN OFF
FRAME ADVANCE
16 CUE/REVIEW SPEED PULSE
33 CYLINDER ON
40 CUE/REVIEW
15 CAPSTAN OFF
37 FRAME ADVANCE
26 TRICK
35 STILL/SLOW
38 AUDIO MUTE
STILL/SLOW
PRE PLAY+B
SW PULSE
REC+B
MOTOR+B
MOTOR GND
ON/OFF+5V
ON/OFF+12V
REEL MOTOR CTL 18
REEL B
REEL A
REEL (+)
REEL (−)
22 21 19 20
PLAY + B 27
PRE PLAY+B 30
REC + B 28
GND 32
41 REC LED
34 29 PLAY LED PAUSE LED
42 OVER REC
WX01
P604
2 REC LED
3 PLAY LED
4 PAUSE LED
Q610
OVER REC
TRICK
STILL/SLOW
AUDIO MUTE
PRE PLAY+B
REC+B
PLAY+B
ON/OFF+12V
EVER+12V
GND
VIDEO & AUDIO
EVER + 5V
EVER + 5V REGULATOR
Q611, D601, D602
ON/OFF + 12V
P601
ON OFF + 12V 7
GND 6
MOTOR + B 5
MOTOR GND 4
HEATER ON 8
EVER + 12V 3
DC + 9V 1
Q632
Q631
START SENSOR
END SENSOR
P605
END SENSOR 7
START SENSOR 8
GND 9
REC INHIBIT 6
CASSETTE IN SW 5
CASSETTE DOWN SW 4
SLOT OUT SW 3
F/L MOTOR (−) 2
F/L MOTOR (+) 1
F/L MOTOR
MOTOR + B
IC602 TA7288P
CONTROL CIRCUIT
MOTOR GND
Q630
VOLTAGE CONVERSION
P608
LOADING M (+) 1
LOADING M (−) 2
LOADING MOTOR
P606
CAM SW A 3
CAM SW B 2
GND 1
ON/OFF + 12V
ON/OFF+12V
IC604 TA75393P
REFERENCE VOLTAGE
R681, Q624
R680, R682
R651
P607
TU REEL 6
TU REEL 5
HALL ELEMENT
24 POLES
12 PULSE
VOLTAGE CONVERSION
Q618, Q619, Q623
Q625, Q626
MOTOR + B
IC603
TA7267P
Q620,Q621
MOTOR GND
R643
P607
REEL MOTOR (−) 1
REEL MOTOR (+) 3
REEL MOTOR
Q615
Q617
Q616
TIMER2
SELECTOR
P602
GND 1
EVER + 5V 2
PLAY + B 3
ON/OFF + 5V 4
QL11
QL12
WX04
PL02
6 POWER ON

Serial Transmission


START CODE
CLOCK
DATA
more than 5ms
approx 5ms
Timer1
Logic1
Timer2
Logic2
Timer3
Logic3
Timer4
Logic4
Timer5
Logic5
Timer6
Logic6
Timer7
Logic7
Timer8
Logic8

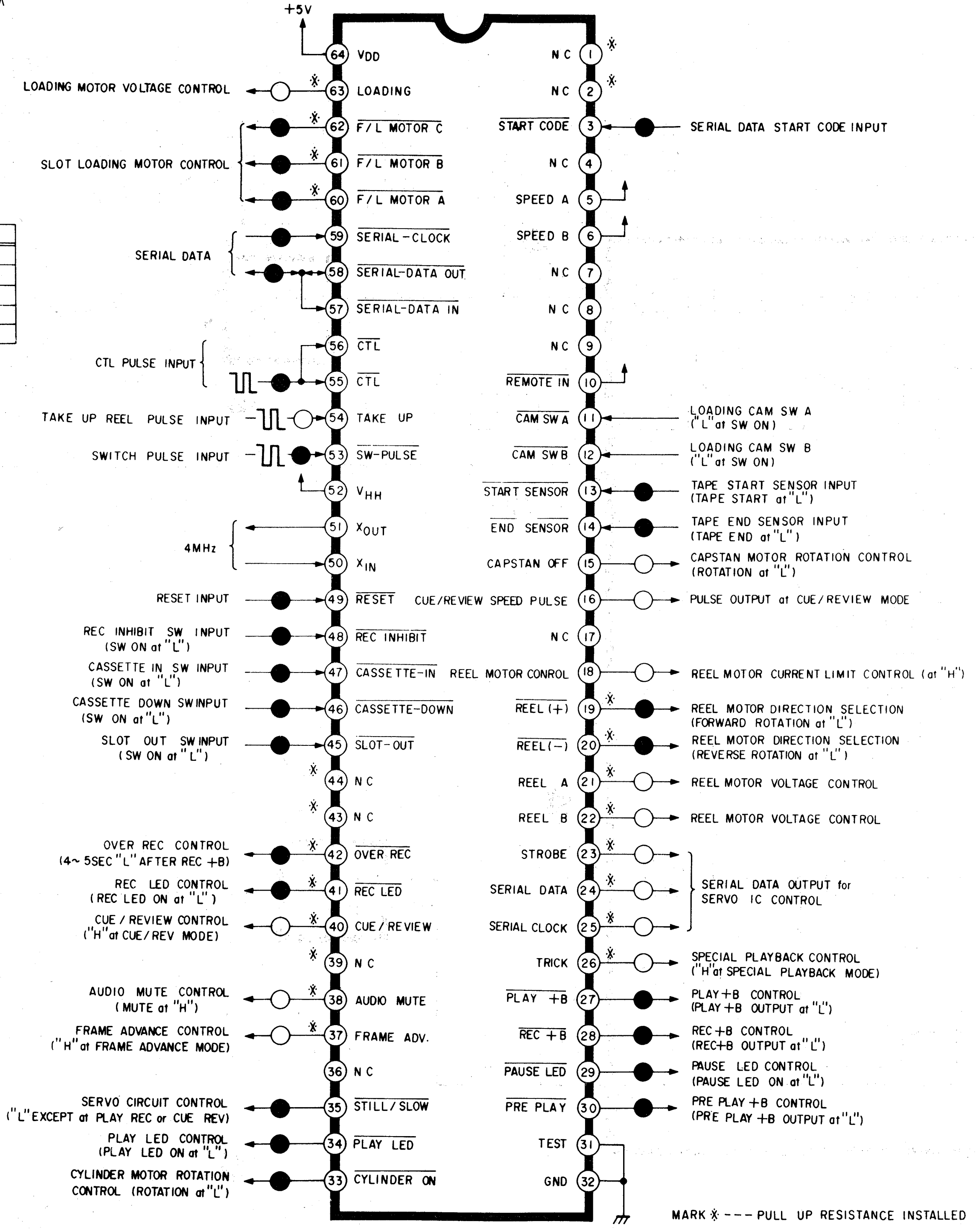
Period: 30ms

Direction	Data	
Timer → Logic	Power ON/OFF Key & remote control input Timer recording Auto PLAY mode Counter memory mode Counter reset Counter (back-up)	Timer 2 Timer 2·3 Timer 2·3 Timer 1 Timer 1 Timer 2·3 Timer 4 ~ 7
Logic → Timer	Mode data Power ON/OFF Counter TAPE speed (PLAY) ⊙⊙ display REC INHIBIT	Logic 2·3 Logic 2 Logic 4 ~ 7 Logic 1 Logic 1 Logic 1

MODE	A	B	C
STOP	H	H	H
SLOT IN	L	H	L
SLOT OUT	L	H	H
LOADING	H	L	L
UNLOADING	H	L	H

Microcomputer's Pin Terminal Functions

Logic Microcomputer
IC601 TMP-4746N5759


+5V
LOADING MOTOR VOLTAGE CONTROL
SLOT LOADING MOTOR CONTROL
SERIAL DATA
CTL PULSE INPUT
TAKE UP REEL PULSE INPUT
SWITCH PULSE INPUT
4MHz
RESET INPUT
REC INHIBIT SW INPUT (SW ON at "L")
CASSETTE IN SW INPUT (SW ON at "L")
CASSETTE DOWN SW INPUT (SW ON at "L")
SLOT OUT SW INPUT (SW ON at "L")
OVER REC CONTROL (4~5SEC "L" AFTER REC +B)
REC LED CONTROL (REC LED ON at "L")
CUE / REVIEW CONTROL ("H" at CUE/REV MODE)
AUDIO MUTE CONTROL (MUTE at "H")
FRAME ADVANCE CONTROL ("H" at FRAME ADVANCE MODE)
SERVO CIRCUIT CONTROL ("L" EXCEPT at PLAY REC or CUE REV)
PLAY LED CONTROL (PLAY LED ON at "L")
CYLINDER MOTOR ROTATION CONTROL (ROTATION at "L")
64 VDD
63 LOADING
62 F/L MOTOR C
61 F/L MOTOR B
60 F/L MOTOR A
59 SERIAL-CLOCK
58 SERIAL-DATA OUT
57 SERIAL-DATA IN
56 CTL
55 CTL
54 TAKE UP
53 SW-PULSE
52 VHH
51 XOUT
50 XIN
49 RESET
48 REC INHIBIT
47 CASSETTE-IN
46 CASSETTE-DOWN
45 SLOT-OUT
44 NC
43 NC
42 OVER REC
41 REC LED
40 CUE/REVIEW
39 NC
38 AUDIO MUTE
37 FRAME ADV.
36 NC
35 STILL/SLOW
34 PLAY LED
33 CYLINDER ON
1 NC
2 NC
3 START CODE
4 NC
5 SPEED A
6 SPEED B
7 NC
8 NC
9 NC
10 REMOTE IN
11 CAM SW A
12 CAM SW B
13 START SENSOR
14 END SENSOR
15 CAPSTAN OFF
16 CUE/REVIEW SPEED PULSE
17 NC
18 REEL MOTOR CONROL
19 REEL (+)
20 REEL (−)
21 REEL A
22 REEL B
23 STROBE
24 SERIAL DATA
25 SERIAL CLOCK
26 TRICK
27 PLAY +B
28 REC +B
29 PAUSE LED
30 PRE PLAY
31 TEST
32 GND
SERIAL DATA START CODE INPUT
LOADING CAM SW A ("L" at SW ON)
LOADING CAM SW B ("L" at SW ON)
TAPE START SENSOR INPUT (TAPE START at "L")
TAPE END SENSOR INPUT (TAPE END at "L")
CAPSTAN MOTOR ROTATION CONTROL (ROTATION at "L")
PULSE OUTPUT at CUE/REVIEW MODE
REEL MOTOR CURRENT LIMIT CONTROL (at "H")
REEL MOTOR DIRECTION SELECTION (FORWARD ROTATION at "L")
REEL MOTOR DIRECTION SELECTION (REVERSE ROTATION at "L")
REEL MOTOR VOLTAGE CONTROL
REEL MOTOR VOLTAGE CONTROL
SERIAL DATA OUTPUT for SERVO IC CONTROL
SPECIAL PLAYBACK CONTROL ("H" at SPECIAL PLAYBACK MODE)
PLAY+B CONTROL (PLAY+B OUTPUT at "L")
REC+B CONTROL (REC+B OUTPUT at "L")
PAUSE LED CONTROL (PAUSE LED ON at "L")
PRE PLAY +B CONTROL (PRE PLAY +B OUTPUT at "L")
MARK ※ --- PULL UP RESISTANCE INSTALLED

IC601 (TMP-4746

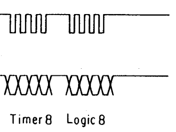
	Mecha. Position (Cam Position)	–
	MODE / TERMINAL	Activ
⑮	CAP OFF	H
⑯	SPEED PULSE	–
⑱	RM CL	H
⑲	REEL (+)	L
⑳	REEL (–)	L
㉑	REEL A	H
㉒	REEL B	H
㉖	TRICK	H
㉗	PLAY +B	L
㉘	REC +B	L
㉙	PAUSE LED	L
㉚	Pre PLAY +B	L
㉝	DRUM ON	L
㉞	PLAY LED	L
㉟	STILL SLOW	L
㊲	Frame feeding	H
㊳	AUDIO MUTE	H
㊵	Q/R	H
㊶	REC LED	L
㊷	OVER REC	L
(60)	FLM A	–
(61)	FLM B	–
(62)	FLM C	–
(63)	Loading	H

Logic Mode Shift Table

MODE / KEY INPUT	SLOT IN	SLOT OUT	STOP	TAPE START	TAPE END
STOP	○	X	–	Start FF	–
FF	△	X	○	○	AUTO REW
REW	△	X	○	STOP (Short FF)	○
PLAY	△	X	○	○ (Short FF)	AUTO REW
PAUSE/STILL	X	X	X	X	X
Frame Matching	X	X	X	X	X
REC	△	△	○	○ (Short FF)	AUTO REW
Timer REC	X	X	○	○ (Short FF)	Power OFF
EJECT	○	–	○	○	○
TAPE END	–	–	–	EJECT	–
TAPE START	–	–	Short FF	–	EJECT
Reel NG Take Up	–	X	X	–	–
POWER	After Motor OFF Power OFF	After Motor OFF Power OFF	Power OFF	Power OFF	Power OFF
COUNTER RESET	○	○	○	○	○
COUNTER MEMORY	○	○	○	○	○
Cylinder Rotation NG	–	–	–	–	–

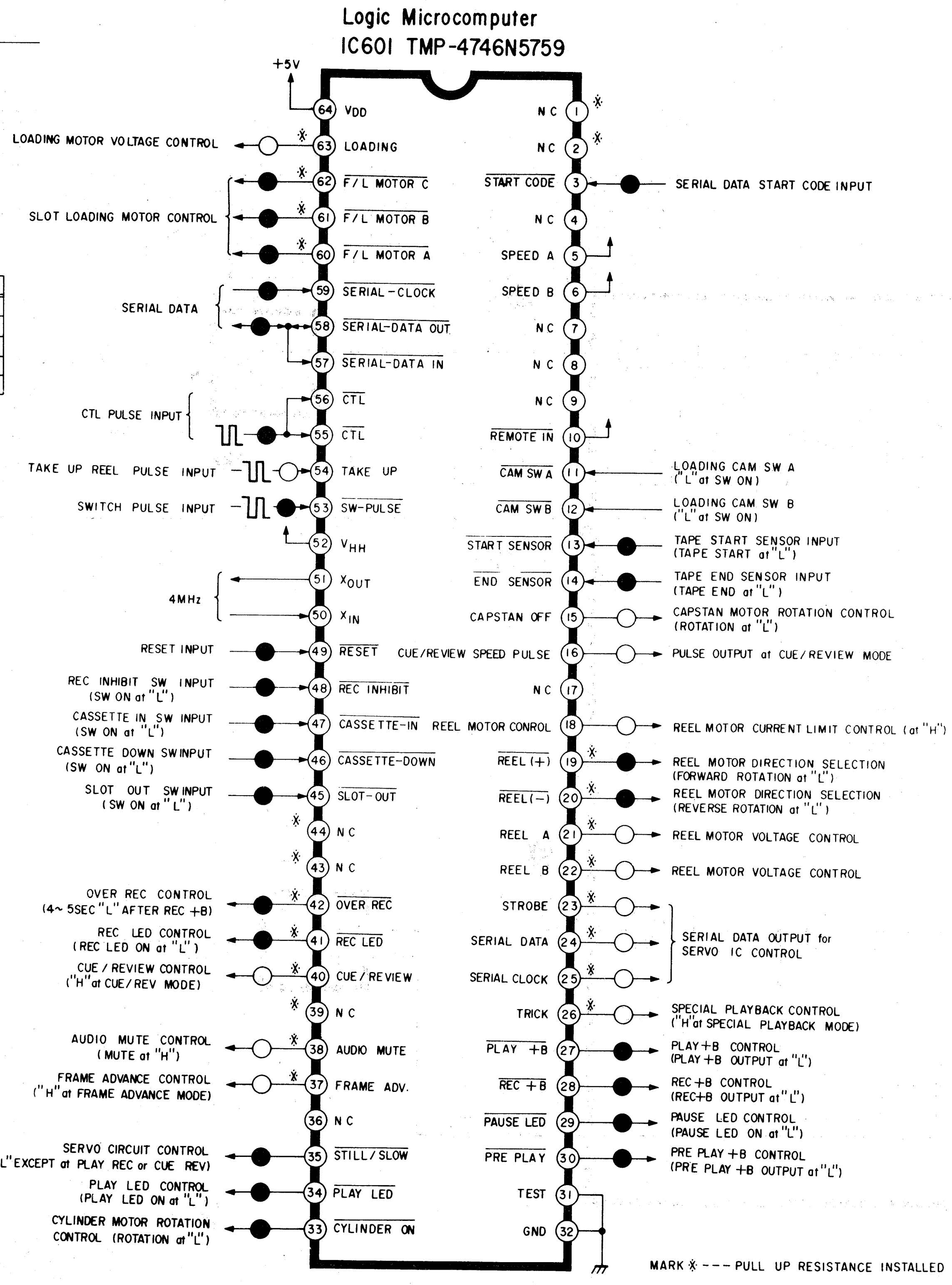
Note: * When pushed continuously, unit enter SLOW mode.
** Mode changes when PLAY +B is only ON.
△ Same as normal mode shift.
○ Directily shifted to the specified mode.
X Not shifted.

Operations except EJECT can be controlled by the remote contrc


Timer 8
Logic 8

A	B	C
H	H	H
L	H	L
L	H	H
H	L	L
H	L	H

Microcomputer's Pin Terminal Functions


Logic Microcomputer
IC601 TMP-4746N5759
+5V
64 VDD
LOADING MOTOR VOLTAGE CONTROL
63 LOADING
SLOT LOADING MOTOR CONTROL
62 F/L MOTOR C
61 F/L MOTOR B
60 F/L MOTOR A
SERIAL DATA
59 SERIAL-CLOCK
58 SERIAL-DATA OUT
57 SERIAL-DATA IN
CTL PULSE INPUT
56 CTL
55 CTL
TAKE UP REEL PULSE INPUT
54 TAKE UP
SWITCH PULSE INPUT
53 SW-PULSE
52 VHH
4MHz
51 XOUT
50 XIN
RESET INPUT
49 RESET
REC INHIBIT SW INPUT (SW ON at "L")
48 REC INHIBIT
CASSETTE IN SW INPUT (SW ON at "L")
47 CASSETTE-IN
CASSETTE DOWN SW INPUT (SW ON at "L")
46 CASSETTE-DOWN
SLOT OUT SW INPUT (SW ON at "L")
45 SLOT-OUT
44 N C
43 N C
OVER REC CONTROL (4~5SEC "L" AFTER REC +B)
42 OVER REC
REC LED CONTROL (REC LED ON at "L")
41 REC LED
CUE / REVIEW CONTROL ("H" at CUE/REV MODE)
40 CUE / REVIEW
39 N C
AUDIO MUTE CONTROL (MUTE at "H")
38 AUDIO MUTE
FRAME ADVANCE CONTROL ("H" at FRAME ADVANCE MODE)
37 FRAME ADV.
36 N C
SERVO CIRCUIT CONTROL ("L" EXCEPT at PLAY REC or CUE REV)
35 STILL / SLOW
PLAY LED CONTROL (PLAY LED ON at "L")
34 PLAY LED
CYLINDER MOTOR ROTATION CONTROL (ROTATION at "L")
33 CYLINDER ON
N C 1
N C 2
START CODE 3
SERIAL DATA START CODE INPUT
N C 4
SPEED A 5
SPEED B 6
N C 7
N C 8
N C 9
REMOTE IN 10
CAM SW A 11
LOADING CAM SW A ("L" at SW ON)
CAM SW B 12
LOADING CAM SW B ("L" at SW ON)
START SENSOR 13
TAPE START SENSOR INPUT (TAPE START at "L")
END SENSOR 14
TAPE END SENSOR INPUT (TAPE END at "L")
CAPSTAN OFF 15
CAPSTAN MOTOR ROTATION CONTROL (ROTATION at "L")
CUE/REVIEW SPEED PULSE 16
PULSE OUTPUT at CUE/REVIEW MODE
N C 17
REEL MOTOR CONROL 18
REEL MOTOR CURRENT LIMIT CONTROL (at "H")
REEL (+) 19
REEL MOTOR DIRECTION SELECTION (FORWARD ROTATION at "L")
REEL (−) 20
REEL MOTOR DIRECTION SELECTION (REVERSE ROTATION at "L")
REEL A 21
REEL MOTOR VOLTAGE CONTROL
REEL B 22
REEL MOTOR VOLTAGE CONTROL
STROBE 23
SERIAL DATA 24
SERIAL CLOCK 25
SERIAL DATA OUTPUT for SERVO IC CONTROL
TRICK 26
SPECIAL PLAYBACK CONTROL ("H" at SPECIAL PLAYBACK MODE)
PLAY +B 27
PLAY+B CONTROL (PLAY+B OUTPUT at "L")
REC +B 28
REC+B CONTROL (REC+B OUTPUT at "L")
PAUSE LED 29
PAUSE LED CONTROL (PAUSE LED ON at "L")
PRE PLAY 30
PRE PLAY +B CONTROL (PRE PLAY +B OUTPUT at "L")
TEST 31
GND 32
MARK ※ --- PULL UP RESISTANCE INSTALLED

IC601 (TMP-4746N5759) Output Signal Polarities

	Mecha. Position (Cam Position)	–	II	II	–	–	I	I	II	VI	VI	V	V	V	V	VII	VI	
	MODE / TERMINAL	Active	Slot-In	Slot-out	Load-ing	Un-loading	FF	REW	STOP	CUE	RE-VIEW	PLAY	STILL	Frame feeding	REC	REC PAUSE	Reverse	Note
⑮	CAP OFF	H	H	H	H	H	H	H	H	H	H	L	H	⊔	L	H	H	
⑯	SPEED PULSE	–	L	L	L	L	L	L	L	⎍⎍	⎍⎍	L	L	L	L	L	L	Controlled by every other falling edge of CTL pulses.
⑱	RM CL	H	L	L	L	H	L	L	L	L	L	H	L	L	H	L	L	
⑲	REEL (+)	L	H	H	L	H	L	H	H	L	H	L	L	L	L	H	H	
⑳	REEL (–)	L	H	H	H	L	H	L	H	H	L	H	H	H	H	H	L	
㉑	REEL A	H	L	L	L*	⎍⎍⎍	L*	L*	L	L*	L*	⎍⎍⎍	H	⊔	⎍⎍⎍	L	⎍⎍⎍	*PWM at starting
㉒	REEL B	H	L	L	H	L	L	L	L	L	L	L	H	H	L	L	L	
㉖	TRICK	H	L	L	L	L	L	L	L	H	H	L	H	H	L	L	L	
㉗	PLAY +B	L	H	H	H	H	H	H	H	L	L	L	L	L	H	H	H	
㉘	REC +B	L	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	
㉙	PAUSE LED	L	H	H	H△	H	H	H	H	H	H	H	L	L	H	L	H	△:Depending on mode
㉚	Pre PLAY +B	L	H	H	H△	H	H	H	H	L	L	L	L	L	H	H	H	
㉝	DRUM ON	L	H	H	L	L	H	H	H	L	L	L	L	L	L	L	L	
㉞	PLAY LED	L	H	H	H△	H	H	H	H	L	L	L	L	L	H	H	H	△:Depending on mode 1Hz L/H at AUTO PLAY
㉟	STILL SLOW	L	L	L	L	L	L	L	L	H	H	H	L	L	H	L	H	
㊲	Frame feeding	H	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	
㊳	AUDIO MUTE	H	L	L	L	L	L	L	L	H	H	↓	H	H	L	L	L	
㊵	Q/R	H	L	L	L	L	L	L	L	H	H	L	L	L	L	L	L	
(41)	REC LED	L	H	H	H△	H	H	H	H	H	H	H	H	H	L	L	H	△:Depending on mode
(42)	OVER REC	L	H	H	H	H	H	H	H	H	H	H	H	H	⊔ t	H	H	t = 4 ~ 5 sec.
(60)	FLM A	–	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	
(61)	FLM B	–	H	H	L	L	H	H	H	H	H	H	H	H	H	H	H	
(62)	FLM C	–	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	
(63)	Loading	H	L	L	H	H	L	L	L	L	L	L	L	L	L	L	L	

Logic Mode Shift Table

MODE / KEY INPUT	SLOT IN	SLOT OUT	STOP	TAPE START	TAPE END	FF	REW	CUE	REVIEW	PLAY	STILL	Frame Matching	REC	Timer REC	REC PAUSE	RE-VERSE	LOAD-ING	UNLOAD-ING	Power OFF
STOP	○	X	–	Start FF	–	○	○	○	○	○	○		○ (Un-loading)	X	○ (No Un-loading)	○	○	△	X
FF	△	X	○	○	AUTO REW	–	○	X	CUE	CUE**	CUE**		X	X	X	△	X	△	X
REW	△	X	○	STOP (Short FF)	○	○	–	RE-VIEW	X	RE-VIEW**	RE-VIEW**		X	X	X	△	X	△	X
PLAY	△	X	○	○ (Short FF)	AUTO REW	○	○	○	○	–	X		X	X	X	△	△	△	X
PAUSE/STILL	X	X	X	X	X	X	X	X	X	STILL	PLAY		REC PAUSE	X	REC	△	△	△	X
Frame Matching	X	X	X	X	X	X	X	X	X	X	○*	–	X	X	X	△	△	△	X
REC	△	△	○	○ (Short FF)	AUTO REW	X	X	X	X	X	REC PAUSE		–	X	X	△	△	△	X
Timer REC	X	X	○	○ (Short FF)	Power OFF	○	○	○	○	○	○		○	–	○	○	○	△	X
EJECT	○	–	○	○	○	○	○	○	○	○	○		X	X	X	△	△	△	X
TAPE END	–	–	–	EJECT	–	AUTO REW	X	AUTO REW	X	AUTO REW	AUTO REW	AUTO REW	AUTO REW	POWER OFF	AUTO REW	AUTO REW	Unloading	△	–
TAPE START	–	–	Short FF	–	EJECT	Short FF	STOP (Short FF)	X	STOP (Short FF)	X	X	X	X	X	X	Reverse OFF	Short FF	Short FF	
Reel NG Take Up	–	X	X	–	–	STOP	STOP	STOP	STOP	STOP	X	STOP	STOP	POWER OFF	X	X	X	X	–
POWER	After Motor OFF Power OFF	After Motor OFF Power OFF	Power OFF	Power OFF	Power OFF	After STOP Power OFF	After STOP Power OFF	After STOP Power OFF	After STOP Power OFF	After STOP Power OFF	After STOP Power OFF	After STOP Power OFF	After STOP Power OFF	STOP	After STOP Power OFF	After STOP Power OFF	After Motor OFF Power OFF	After Motor OFF Power OFF	Power ON
COUNTER RESET	○	○	○	○	○	○	○	○	○	○	○	X	○	○	○	○	○	○	X
COUNTER MEMORY	○	○	○	○	○	○	○	○	○	○	○	X	○	○	○	○	○	○	X
Cylinder Rotation NG	–	–	–	–	–	X	X	STOP	STOP	STOP	STOP	STOP	STOP	Power OFF	STOP	STOP	STOP	STOP	

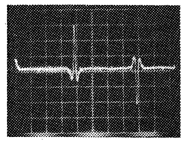
Note: * When pushed continuously, unit enter SLOW mode.
** Mode changes when PLAY +B is only ON.
△ Same as normal mode shift.
○ Directily shifted to the specified mode.
X Not shifted.

Operations except EJECT can be controlled by the remote controller VC-73.

12-1. Servo Block Diagram

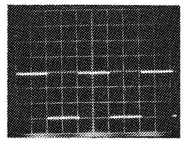
Cylinder Servo Signal Line

1



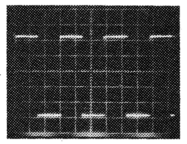
V: 0.5V/div.
H: 5ms/div.

2



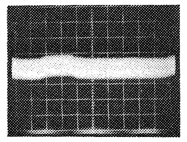
V: 1V/div.
H: 10ms/div.

3



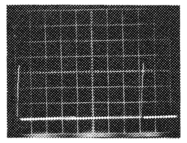
V: 1V/div.
H: 5µs/div.

4



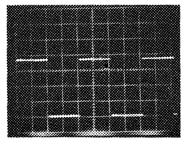
V: 0.2V/div.
H: 10ms/div.

5



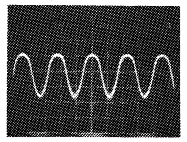
V: 1V/div.
H: 5ms/div.

6



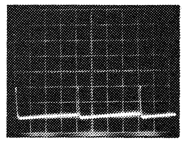
V: 1V/div.
H: 10ms/div.

7



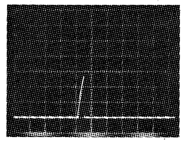
V: 0.2V/div.
H: 0.1µs/div.

8

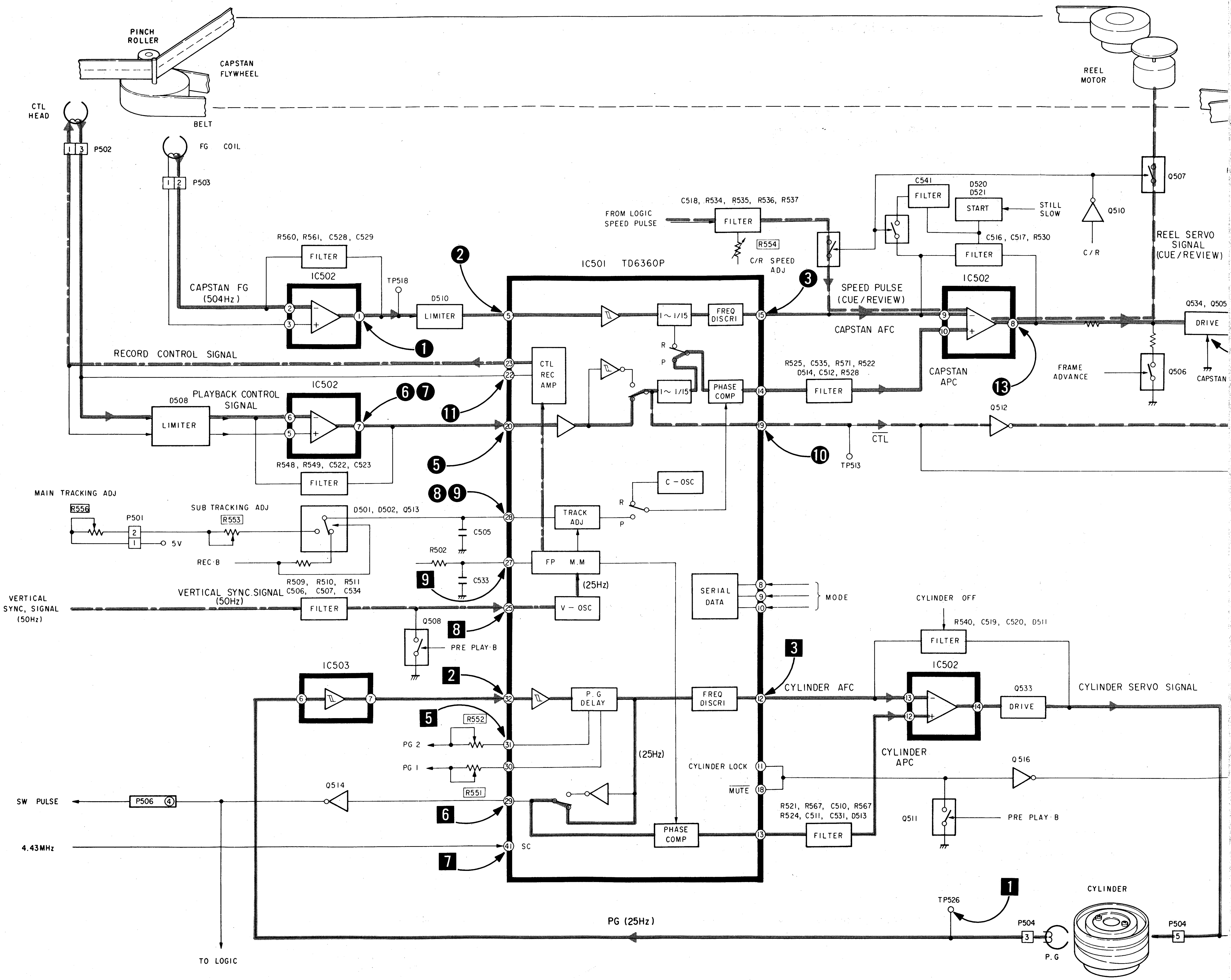


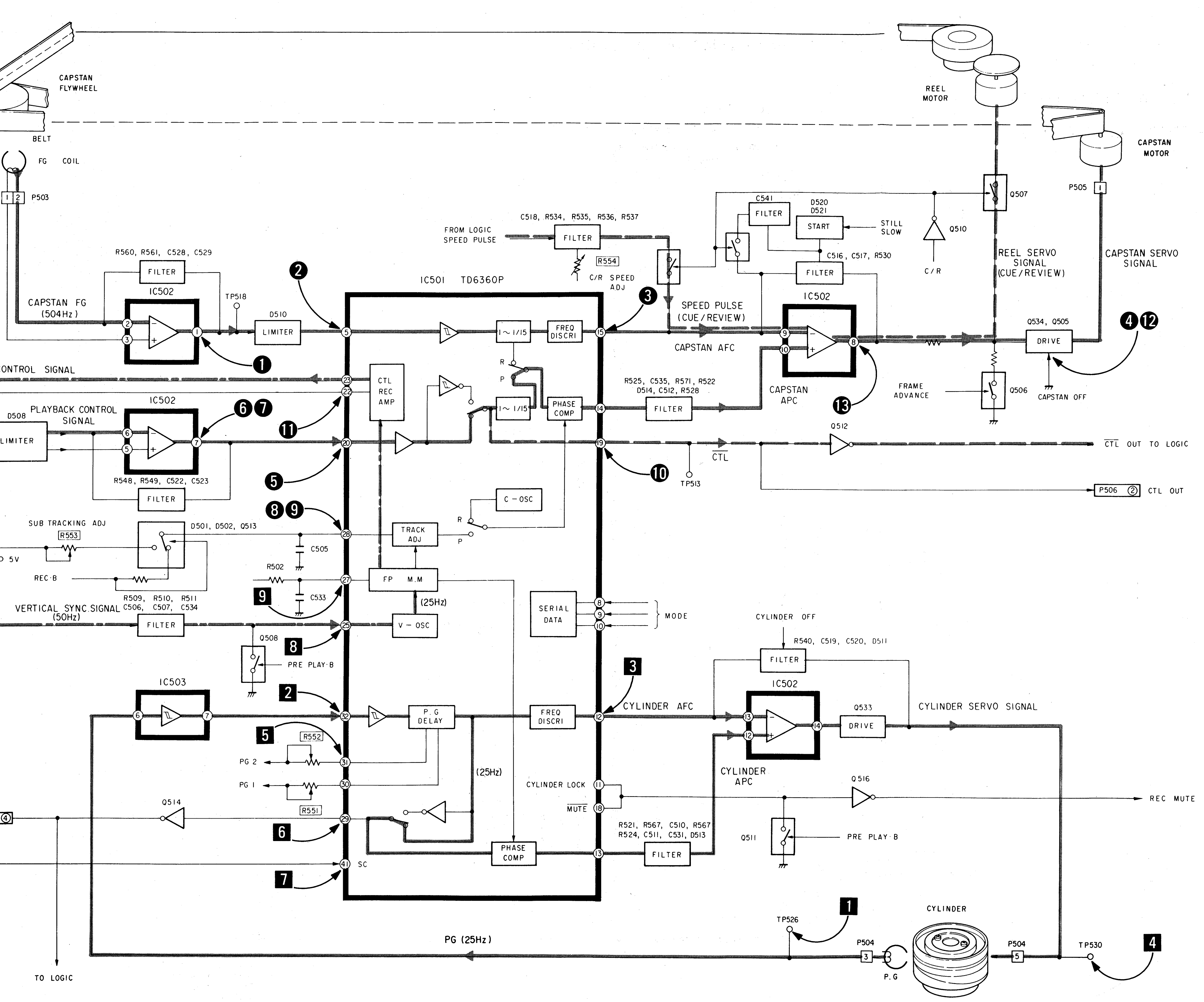
V: 0.5V/div.
H: 5ms/div.

9

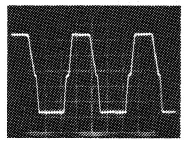
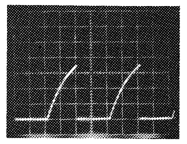
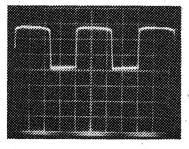
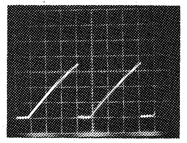
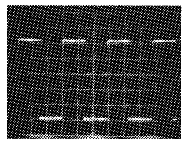
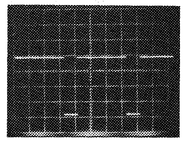
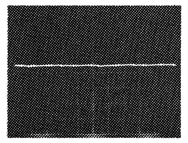
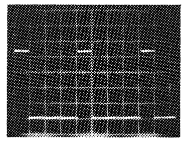
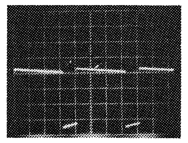
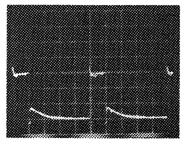
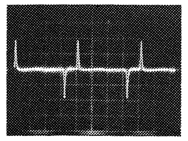
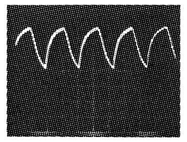
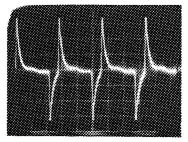


V: 1V/div.
H: 20µs/div.


PINCH ROLLER
CAPSTAN FLYWHEEL
BELT
CTL HEAD
P502
FG COIL
P503
REEL MOTOR
Q507
D520
D521
C541
FILTER
START
STILL
SLOW
Q510
C/R
C516, C517, R530
FILTER
REEL SERVO SIGNAL (CUE/REVIEW)
C518, R534, R535, R536, R537
FROM LOGIC SPEED PULSE
FILTER
R554
C/R SPEED ADJ
R560, R561, C528, C529
FILTER
IC502
CAPSTAN FG (504Hz)
TP518
D510
LIMITER
IC501 TD6360P
I~1/15
FREQ DISCRI
SPEED PULSE (CUE/REVIEW)
IC502
CAPSTAN AFC
Q534, Q505
DRIVE
RECORD CONTROL SIGNAL
CTL REC AMP
R
P
I~1/15
PHASE COMP
R525, C535, R571, R522
D514, C512, R528
FILTER
CAPSTAN APC
FRAME ADVANCE
Q506
CAPSTAN
D508
LIMITER
PLAYBACK CONTROL SIGNAL
IC502
R548, R549, C522, C523
FILTER
Q512
CTL
TP513
C-OSC
MAIN TRACKING ADJ
R556
P501
5V
SUB TRACKING ADJ
R553
D501, D502, Q513
C505
TRACK ADJ
R502
REC·B
C533
FP M.M
(25Hz)
R509, R510, R511
C506, C507, C534
VERTICAL SYNC. SIGNAL (50Hz)
VERTICAL SYNC. SIGNAL (50Hz)
FILTER
V-OSC
Q508
PRE PLAY·B
SERIAL DATA
MODE
CYLINDER OFF
R540, C519, C520, D511
FILTER
IC503
P.G DELAY
FREQ DISCRI
CYLINDER AFC
IC502
Q533
DRIVE
CYLINDER SERVO SIGNAL
R552
PG 2
PG 1
R551
(25Hz)
CYLINDER LOCK
MUTE
CYLINDER APC
Q516
Q514
SW PULSE
P506
R521, R567, C510, R567
R524, C511, C531, D513
FILTER
Q511
PRE PLAY·B
PHASE COMP
4.43MHz
SC
TP526
CYLINDER
PG (25Hz)
P504
P504
P.G
TO LOGIC


CAPSTAN FLYWHEEL
BELT
FG COIL
P503
1 2
REEL MOTOR
CAPSTAN MOTOR
P505
Q507
C541
FILTER
D520
D521
START
STILL
SLOW
Q510
C/R
FROM LOGIC SPEED PULSE
FILTER
C518, R534, R535, R536, R537
R554
C/R SPEED ADJ
C516, C517, R530
FILTER
REEL SERVO SIGNAL (CUE/REVIEW)
CAPSTAN SERVO SIGNAL
R560, R561, C528, C529
FILTER
IC502
CAPSTAN FG (504Hz)
TP518
D510
LIMITER
❶
❷
IC501 TD6360P
1～1/15
FREQ DISCRI
❸
SPEED PULSE (CUE/REVIEW)
CAPSTAN AFC
IC502
Q534, Q505
DRIVE
❹⓬
CAPSTAN OFF
FRAME ADVANCE
Q506
⓭
CAPSTAN APC
R525, C535, R571, R522
D514, C512, R528
FILTER
CONTROL SIGNAL
CTL REC AMP
R
P
PHASE COMP
D508
LIMITER
PLAYBACK CONTROL SIGNAL
IC502
❻❼
⓫
❺
R548, R549, C522, C523
FILTER
Q512
CTL
CTL OUT TO LOGIC
TP513
❿
P506 ②
CTL OUT
C-OSC
SUB TRACKING ADJ
R553
5V
D501, D502, Q513
❽❾
TRACK ADJ
C505
R502
REC·B
FP M.M
C533
9
(25Hz)
R509, R510, R511
C506, C507, C534
VERTICAL SYNC.SIGNAL (50Hz)
FILTER
V-OSC
SERIAL DATA
MODE
Q508
8
PRE PLAY·B
CYLINDER OFF
R540, C519, C520, D511
FILTER
IC503
2
P.G DELAY
FREQ DISCRI
3
CYLINDER AFC
IC502
Q533
DRIVE
CYLINDER SERVO SIGNAL
5
R552
PG 2
PG 1
R551
(25Hz)
CYLINDER LOCK
MUTE
CYLINDER APC
Q516
REC MUTE
Q514
④
6
PHASE COMP
R521, R567, C510, R567
R524, C511, C531, D513
FILTER
Q511
PRE PLAY·B
SC
7
TP526
1
CYLINDER
PG (25Hz)
P504
P.G
P504
TP530
4
TO LOGIC

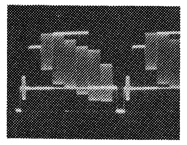
Capstan Servo Signal Line

❶  V: 2V/div. H: 0.5ms/div.	❽ (Play)  V: 1V/div. H: 10ms/div.
❷  V: 0.5V/div. H: 0.5ms/div.	❾ (Rec)  V: 1V/div. H: 10ms/div.
❸  V: 1V/div. H: 5μs/div.	❿  V: 1V/div. H: 10ms/div.
❹ (Rec/Play)  V: 2V/div. H: 2ms/div.	⓫ (Rec)  V: 1V/div. H: 10ms/div.
❺ (Rec)  V: 1V/div. H: 10ms/div.	⓬ (Frame Feeding)  V: 2V/div. H: 20ms/div.
❻ (Play)  V: 0.5V/div. H: 10ms/div.	⓭ (Cue/Review)  V: 1V/div. H: 5ms/div.
❼ (Cue/Review)  V: 0.5V/div. H: 2ms/div.	

13-1. Video Block Diagram

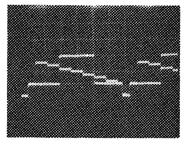
Record Mode

1



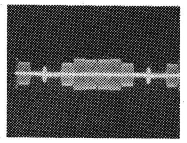
V: 0.2V/div.
H: 10µs/div.

2



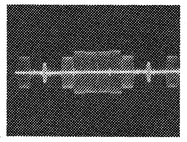
V: 0.2V/div.
H: 10µs/div.

3



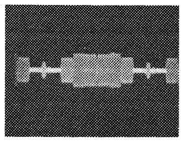
V: 0.1V/div.
H: 10µs/div.

4



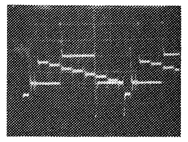
V: 0.2V/div.
H: 10µs/div.

5



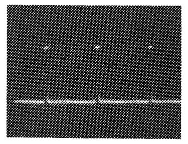
V: 0.5V/div.
H: 10µs/div.

6



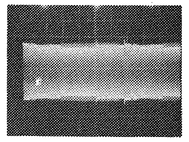
V: 0.2V/div.
H: 10µs/div.

7

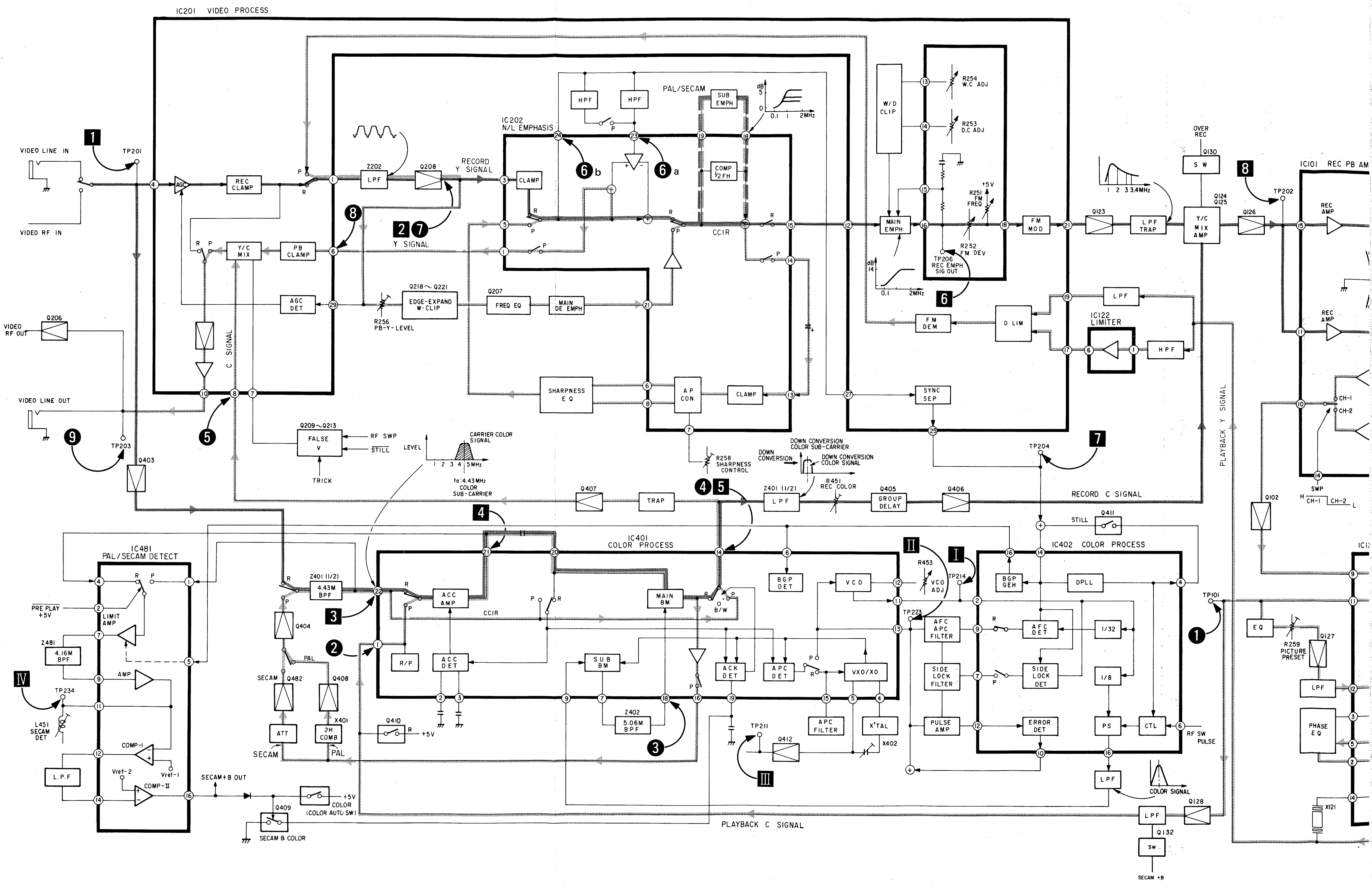


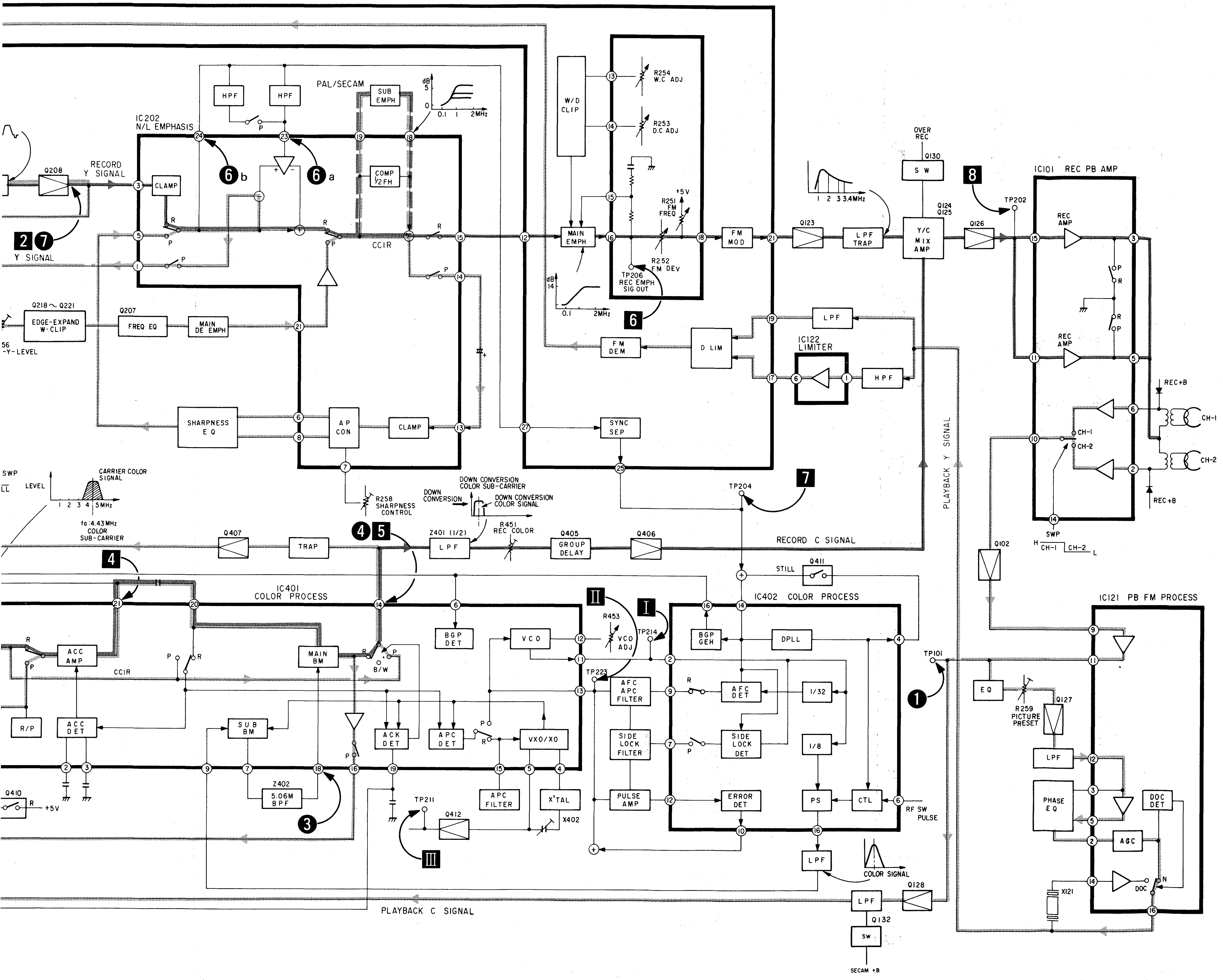
V: 1V/div.
H: 20µs/div.

8

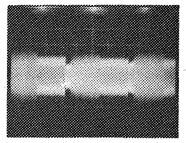


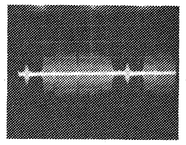
V: 0.2V/div.
H: 10µs/div.

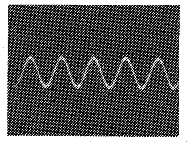

IC201 VIDEO PROCESS
VIDEO LINE IN
VIDEO RF IN
TP201
AGC
REC CLAMP
Z202 LPF
Q208
RECORD Y SIGNAL
Y SIGNAL
Y/C MIX
PB CLAMP
AGC DET
R256 PB-Y-LEVEL
Q218～Q221 EDGE-EXPAND W·CLIP
Q207 FREQ EQ
MAIN DE EMPH
C SIGNAL
VIDEO RF OUT
Q206
VIDEO LINE OUT
TP203
Q403
Q209～Q213 FALSE V
RF SWP
STILL
TRICK
IC202 N/L EMPHASIS
CLAMP
HPF
HPF
PAL/SECAM
SUB EMPH
COMP 1/2 FH
CCIR
SHARPNESS EQ
AP CON
CLAMP
R258 SHARPNESS CONTROL
W/D CLIP
R254 W.C ADJ
R253 D.C ADJ
R251 FM FREQ
R252 FM DEV
+5V
TP206 REC EMPH SIG OUT
MAIN EMPH
FM MOD
FM DEM
D LIM
SYNC SEP
IC122 LIMITER
HPF
LPF
Q123
LPF TRAP
Y/C MIX AMP
Q124 Q125
Q126
OVER REC
Q130 SW
TP202
IC101 REC PB AM
REC AMP
REC AMP
CH-1
CH-2
SWP
PLAYBACK Y SIGNAL
TP204
RECORD C SIGNAL
DOWN CONVERSION COLOR SUB-CARRIER
DOWN CONVERSION
DOWN CONVERSION COLOR SIGNAL
R451 REC COLOR
Z401 (1/2) LPF
Q405 GROUP DELAY
Q406
Q407
TRAP
CARRIER COLOR SIGNAL
LEVEL
1 2 3 4 5MHz
fo:4.43MHz COLOR SUB-CARRIER
IC401 COLOR PROCESS
Z401 (1/2) 4.43M BPF
ACC AMP
ACC DET
R/P
MAIN BM
SUB BM
B/W
BGP DET
VCO
ACK DET
APC DET
VXO/XO
APC FILTER
X'TAL
X402
Z402 5.06M BPF
TP211
Q412
R453 VCO ADJ
TP214
TP223
IC402 COLOR PROCESS
BGP GEN
DPLL
AFC APC FILTER
AFC DET
1/32
SIDE LOCK FILTER
SIDE LOCK DET
1/8
PULSE AMP
ERROR DET
PS
CTL
RF SW PULSE
LPF
COLOR SIGNAL
Q128
LPF
Q132 SW
SECAM +B
STILL Q411
TP101
EQ
R259 PICTURE PRESET
Q127
LPF
PHASE EQ
X121
Q102
PLAYBACK C SIGNAL
IC481 PAL/SECAM DETECT
PRE PLAY +5V
Z481 4.16M BPF
LIMIT AMP
AMP
TP234
L451 SECAM DET
COMP-I
COMP-II
Vref-1
Vref-2
L.P.F
SECAM+B OUT
Q404
Q482
Q408
SECAM
PAL
ATT
2H COMB
X401
Q410 +5V
Q409
COLOR (COLOR AUTO SW)
SECAM & COLOR

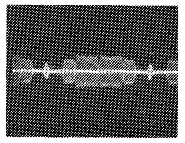

IC202
N/L EMPHASIS
Q208
RECORD
Y SIGNAL
CLAMP
HPF
HPF
PAL/SECAM
SUB EMPH
COMP 1/2 FH
CCIR
W/D CLIP
R254 W.C ADJ
R253 D.C ADJ
R251 FM FREQ
R252 FM DEV
+5V
TP206 REC EMPH SIG OUT
MAIN EMPH
FM MOD
Q123
LPF TRAP
1 2 3 3.4MHz
OVER REC
Q130
SW
Q124 Q125
Y/C MIX AMP
Q126
TP202
IC101 REC PB AMP
REC AMP
REC AMP
REC+B
CH-1
CH-2
SWP
H CH-1 CH-2 L
Y SIGNAL
Q218～Q221
EDGE-EXPAND W·CLIP
Q207
FREQ EQ
MAIN DE EMPH
56 -Y-LEVEL
FM DEM
D LIM
LPF
IC122 LIMITER
HPF
SHARPNESS EQ
AP CON
CLAMP
SYNC SEP
PLAYBACK Y SIGNAL
SWP
LEVEL
CARRIER COLOR SIGNAL
1 2 3 4 5MHz
fo:4.43MHz COLOR SUB-CARRIER
R258 SHARPNESS CONTROL
DOWN CONVERSION
DOWN CONVERSION COLOR SUB-CARRIER
DOWN CONVERSION COLOR SIGNAL
R451 REC COLOR
TP204
Q407
TRAP
Z401 (1/2)
LPF
Q405
GROUP DELAY
Q406
RECORD C SIGNAL
Q102
STILL
Q411
IC401
COLOR PROCESS
ACC AMP
CCIR
MAIN BM
B/W
BGP DET
VCO
R453 VCO ADJ
TP214
TP223
IC402 COLOR PROCESS
BGP GEN
DPLL
TP101
IC121 PB FM PROCESS
R/P
ACC DET
SUB BM
ACK DET
APC DET
VXO/XO
AFC APC FILTER
AFC DET
1/32
SIDE LOCK FILTER
SIDE LOCK DET
1/8
EQ
R259 PICTURE PRESET
Q127
LPF
PHASE EQ
DOC DET
AGC
DOC
Q410
+5V
Z402
5.06M BPF
TP211
Q412
APC FILTER
X'TAL
X402
PULSE AMP
ERROR DET
PS
CTL
RF SW PULSE
LPF
COLOR SIGNAL
Q128
LPF
Q132
SW
SECAM +B
X121
PLAYBACK C SIGNAL
❶
❷❼
❸
❹❺
❹
❻
❻a
❻b
❼
❽
Ⅰ
Ⅱ
Ⅲ

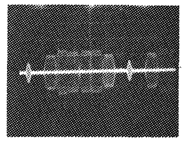
Playback Mode

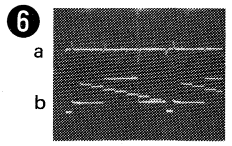
❶

V: 0.2V/div.
H: 5ms/div.

❷

V: 0.1V/div.
H: 10μs/div.

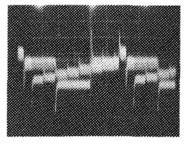
❸

V: 0.1V/div.
H: 0.1μs/div.

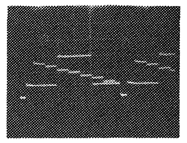
❹

V: 0.5V/div.
H: 10μs/div.

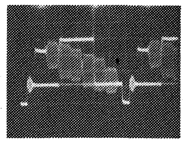
❺

V: 0.2V/div.
H: 10μs/div.

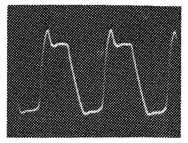
❻


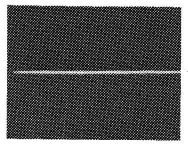
V: 0.5V/div.
H: 10μs/div.

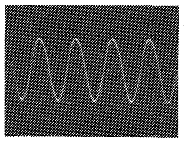
❼

V: 50mV/div.
H: 10μs/div.

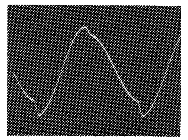
❽

V: 0.2V/div.
H: 10μs/div.

❾

V: 0.5V/div.
H: 10μs/div.

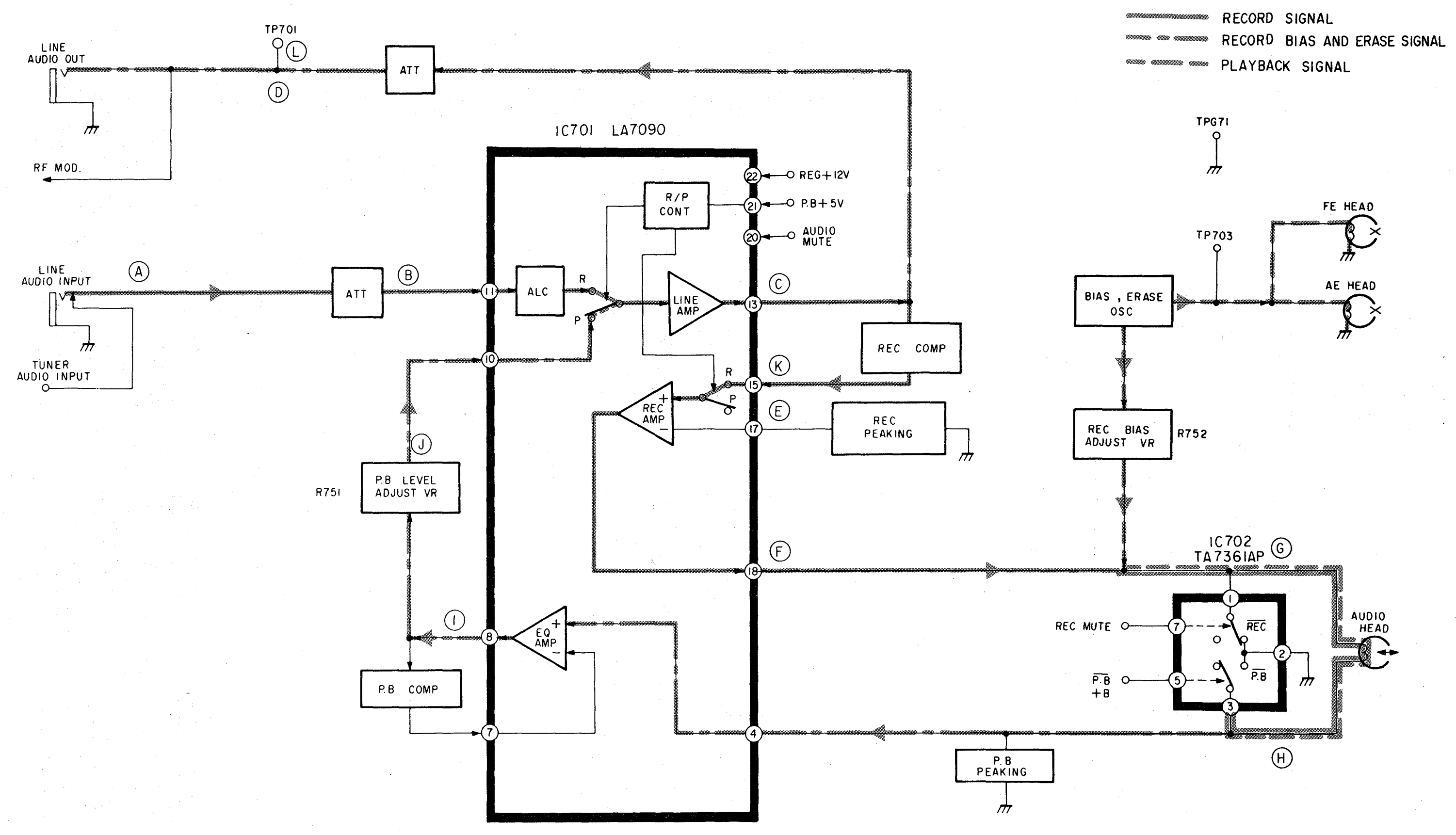
Ⅰ

V: 0.2V/div.
H: 0.05μs/div.

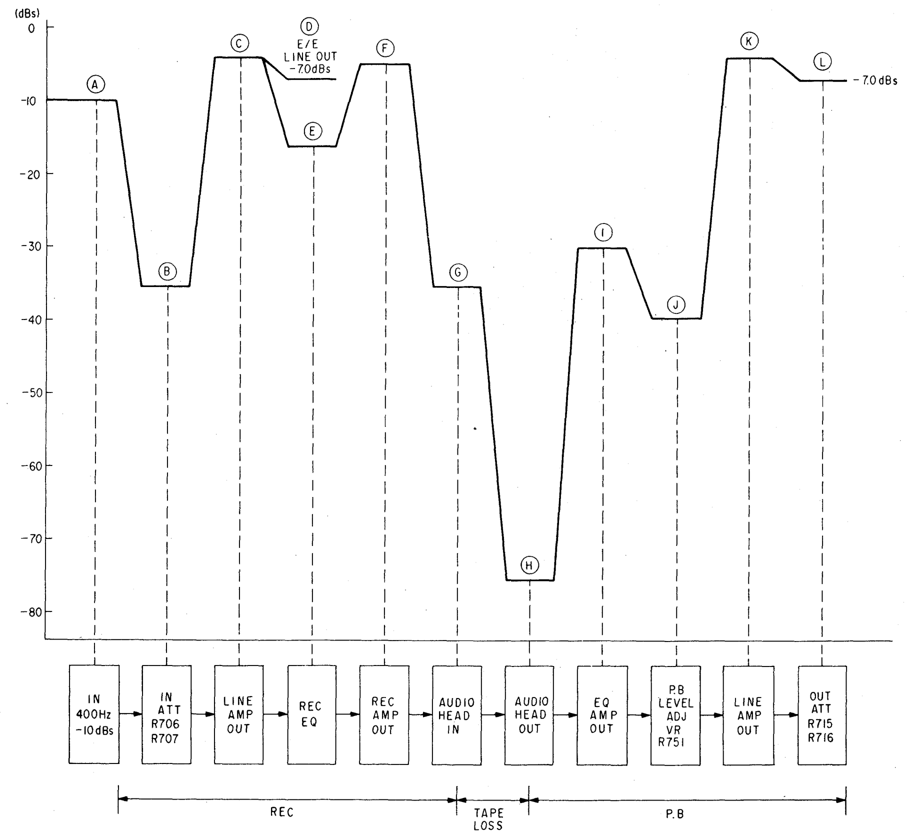
Ⅱ

V: 0.1V/div.
H: 5ms/div.

Ⅲ

V: 0.2V/div.
H: 0.1μs/div.

Ⅳ

V: 0.1V/div.
H: 20μs/div.

14-1. Audio Block Diagram


RECORD SIGNAL
RECORD BIAS AND ERASE SIGNAL
PLAYBACK SIGNAL
LINE AUDIO OUT
TP701
Ⓛ
Ⓓ
ATT
RF MOD.
IC701 LA7090
REG+12V
P.B+5V
AUDIO MUTE
R/P CONT
LINE AUDIO INPUT
Ⓐ
ATT
Ⓑ
ALC
R
P
LINE AMP
Ⓒ
REC COMP
TUNER AUDIO INPUT
Ⓚ
REC AMP
Ⓔ
REC PEAKING
Ⓙ
R751
P.B LEVEL ADJUST VR
Ⓕ
Ⓘ
EQ AMP
P.B COMP
P.B PEAKING
TPG71
TP703
FE HEAD
AE HEAD
BIAS , ERASE OSC
REC BIAS ADJUST VR
R752
IC702 TA7361AP
Ⓖ
REC MUTE
REC
P.B
P.B +B
AUDIO HEAD
Ⓗ



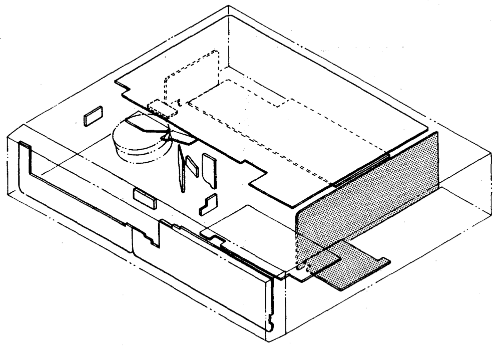
0 dBs 0.775Vrms

Ⓒ = Ⓚ

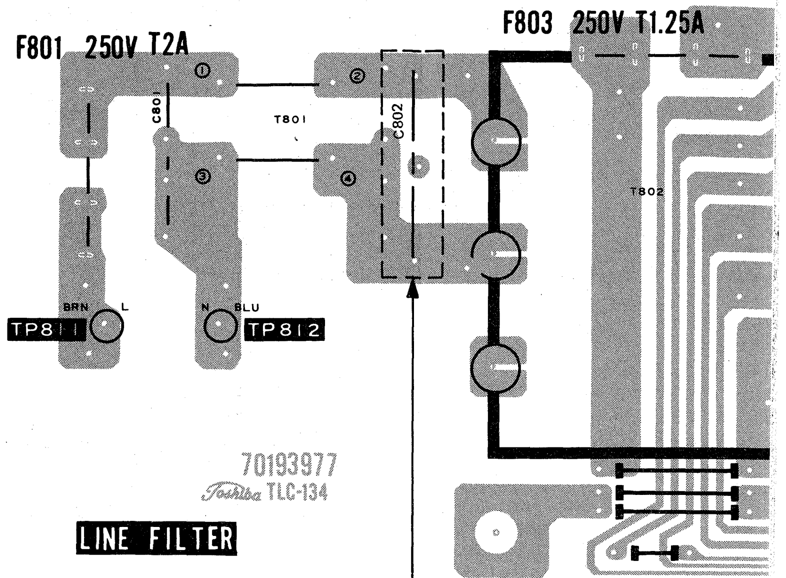
Ⓓ = Ⓛ

※ Ⓖ REC MODE
STOP BIAS OSC
TO MEASURE
(SHORT Q705 BASE
TO THE GND)

8-2. Power Supply PC Board



U802 Power 1 PC Board


1
2
3
4
5
6
A
B
C
D
E
F
G
F801 250V T2A
F803 250V T1.25A
①
②
③
④
C801
C802
T801
T802
BRN
L
N
BLU
TP811
TP812
70193977
Toshiba TLC-134
LINE FILTER

V-81/83G only

Location of Diodes

Symbol No.	Location
D801	C-7
D802	C-7
D803	C-7
D804	C-7
D805	C-7
D806	C-7
D807	D-7
D808	D-7
D809	F-9
D810	F-9
D814	E-8
D815	F-8
D816	E-8
D817	F-8
D818	F-9
D819	E-9
D820	F-9
D821	F-8
D822	E-10

Location of VR's

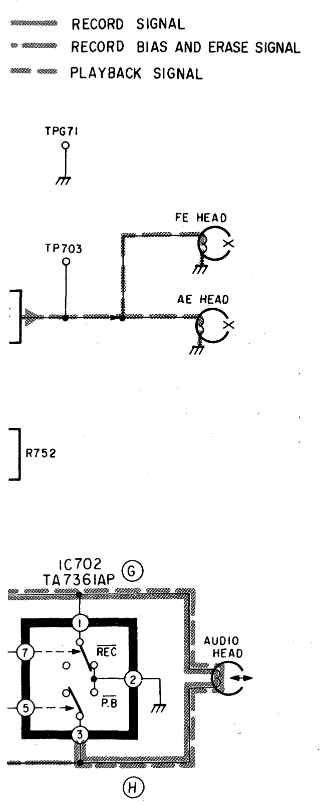
Symbol No.	Location
R851	B-8

Voltage and Location of Transistors

	Q801			Q802			Q803			Q804			Q805		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
STAND-BY	0	0.7	1.3	0.9	19.9	0.9	0	0	0.7	0	19.7	0	0	0	0
EE	0	0.7	1.3	13.6	18.7	14.6	12.0	15.3	12.6	12.0	18.3	13.2	5.6	13.7	6.2
PLAY	0	18.3	0.4	13.5	18.3	14.8	12.0	15.3	12.6	12.0	18.4	13.2	5.6	13.6	6.2
REC	0	17.7	0.4	13.5	17.7	14.8	12.0	15.3	12.6	12.0	17.3	13.2	5.6	13.7	6.2
LOCATION	C-9			E-9			E-10			F-8			F-8		

	Q806			Q807			Q808			Q809			Q810		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
STAND-BY	12.1	18.6	12.8	0	63.9	0	0	0	4.2	64.1	0	64.1	0	0	0
EE	12.0	17.2	12.7	0	0	0.6	0	0	6.0	27.6	27.6	27.0	0	27.6	0
PLAY	12.0	17.3	12.7	0	0	0.6	0	0	6.0	27.6	27.6	26.9	0	27.6	0
REC	12.0	16.3	12.6	0	0	0.6	0	0	6.0	27.4	27.4	26.8	0	27.4	0
LOCATION	E-9			F-9			E-9			F-10			E-9		

	1	2	3	4	5	6	7	8	9	10


RECORD SIGNAL
RECORD BIAS AND ERASE SIGNAL
PLAYBACK SIGNAL
TPG71
FE HEAD
TP703
AE HEAD
R752
IC702
TA7361AP
G
REC
P.B
AUDIO HEAD
H

A

B

C

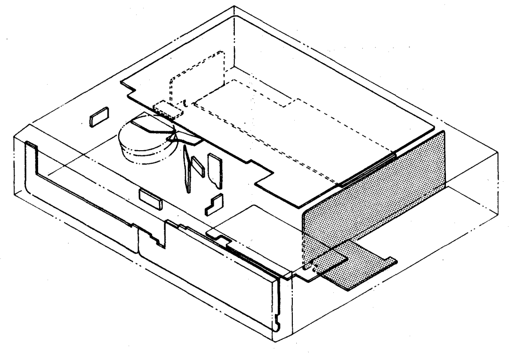
D

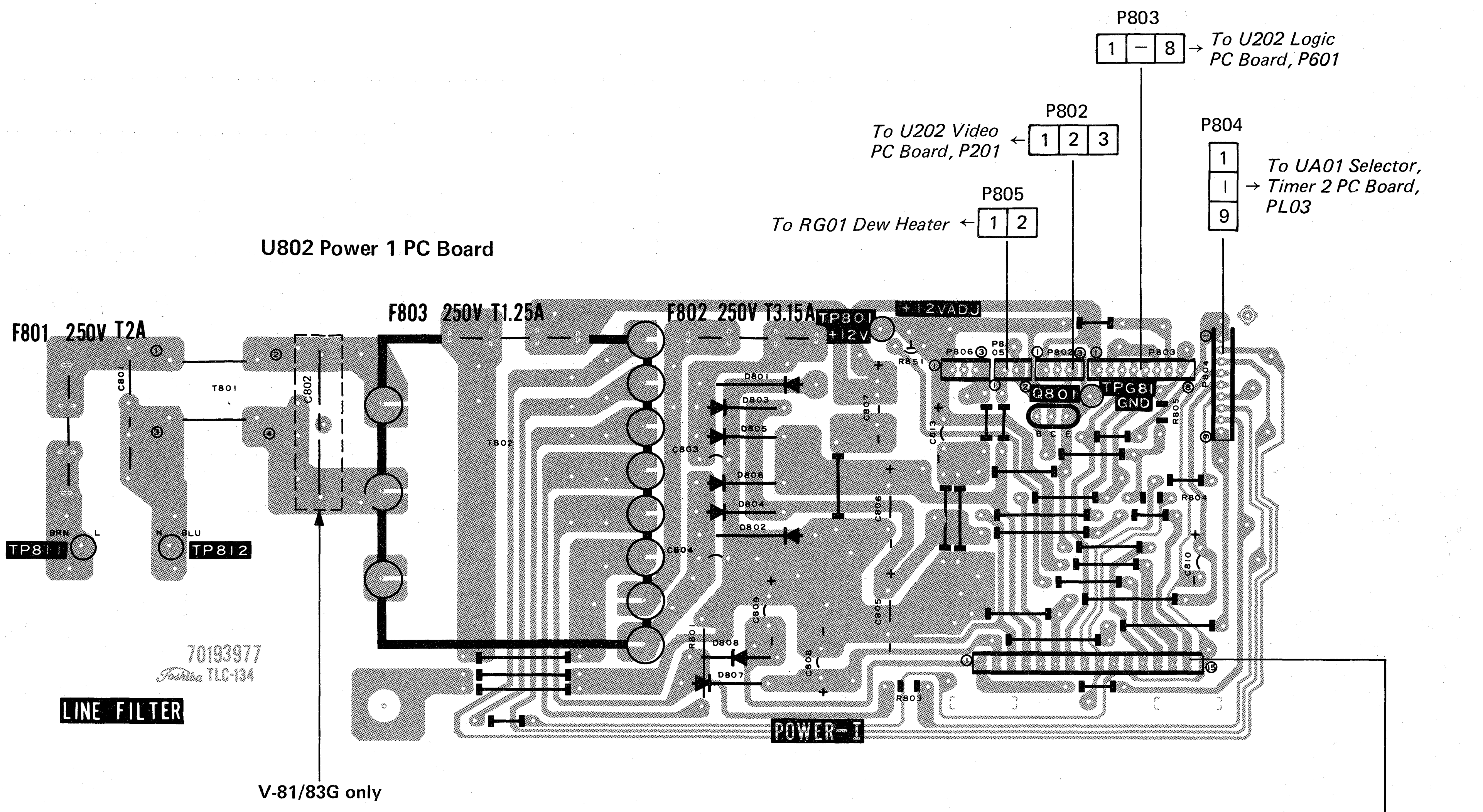
E

F

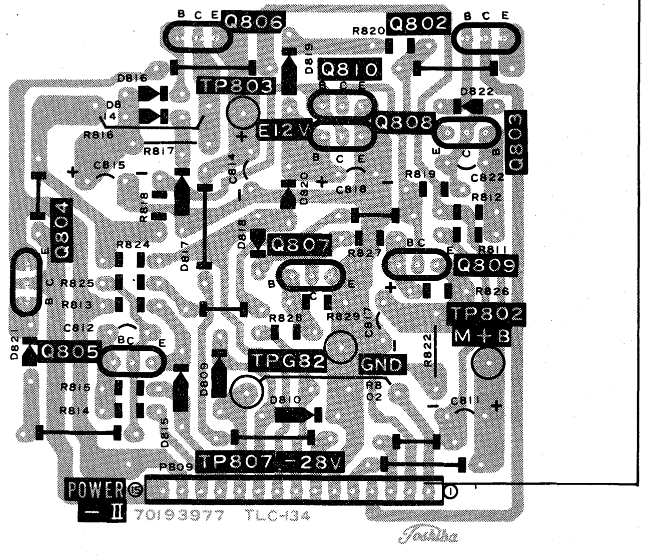
G

8-2. Power Supply PC Board




P803
1 – 8
To U202 Logic PC Board, P601
P802
1 2 3
To U202 Video PC Board, P201
P804
1
I
9
To UA01 Selector, Timer 2 PC Board, PL03
P805
1 2
To RG01 Dew Heater
U802 Power 1 PC Board
F801 250V T2A
F803 250V T1.25A
F802 250V T3.15A
TP801
+12V
+12VADJ
T801
T802
C801
C802
BRN
L
N
BLU
TP811
TP812
D801
D802
D803
D804
D805
D806
D807
D808
C803
C804
C805
C806
C807
C808
C809
C810
C813
R801
R803
R804
R805
R851
P806
P805
P802
P803
P804
Q801
B C E
TPG81
GND
70193977
Toshiba TLC-134
LINE FILTER
POWER-I
V-81/83G only

U803 Power 2 PC Board


Q806
Q802
Q810
Q803
Q808
Q804
Q807
Q809
Q805
TP803
E12V
TP802
M+B
TPG82
GND
TP807 -28V
POWER-II
P809
D814
D816
D819
D822
D817
D818
D820
D821
D809
D810
D815
C814
C815
C817
C818
C811
C812
C822
R816
R817
R818
R812
R819
R820
R811
R824
R825
R813
R815
R814
R826
R827
R828
R829
R822
R802
70193977 TLC-134
Toshiba

Location of Diodes

Symbol No.	Location
D801	C-7
D802	C-7
D803	C-7
D804	C-7
D805	C-7
D806	C-7
D807	D-7
D808	D-7
D809	F-9
D810	F-9
D814	E-8
D815	F-8
D816	E-8
D817	F-8
D818	F-9
D819	E-9
D820	F-9
D821	F-8
D822	E-10

Location of VR's

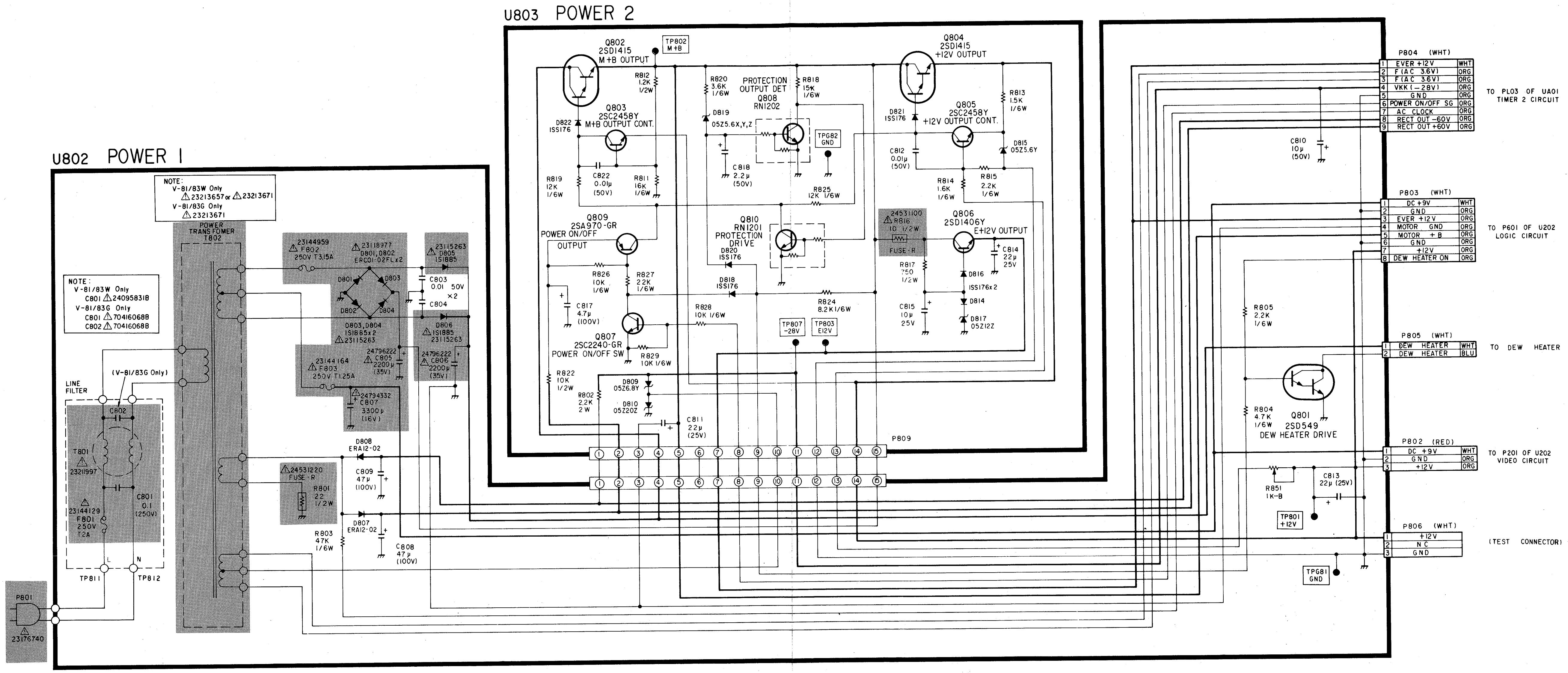
Symbol No.	Location
R851	B-8

Voltage and Location of Transistors

	Q801			Q802			Q803			Q804			Q805		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
STAND-BY	0	0.7	1.3	0.9	19.9	0.9	0	0	0.7	0	19.7	0	0	0	0
EE	0	0.7	1.3	13.6	18.7	14.6	12.0	15.3	12.6	12.0	18.3	13.2	5.6	13.7	6.2
PLAY	0	18.3	0.4	13.5	18.3	14.8	12.0	15.3	12.6	12.0	18.4	13.2	5.6	13.6	6.2
REC	0	17.7	0.4	13.5	17.7	14.8	12.0	15.3	12.6	12.0	17.3	13.2	5.6	13.7	6.2
LOCATION	C-9			E-9			E-10			F-8			F-8		

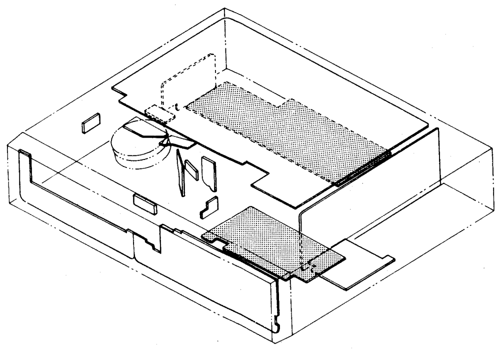
	Q806			Q807			Q808			Q809			Q810		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
STAND-BY	12.1	18.6	12.8	0	63.9	0	0	0	4.2	64.1	0	64.1	0	0	0
EE	12.0	17.2	12.7	0	0	0.6	0	0	6.0	27.6	27.6	27.0	0	27.6	0
PLAY	12.0	17.3	12.7	0	0	0.6	0	0	6.0	27.6	27.6	26.9	0	27.6	0
REC	12.0	16.3	12.6	0	0	0.6	0	0	6.0	27.4	27.4	26.8	0	27.4	0
LOCATION	E-9			F-9			E-9			F-10			E-9		

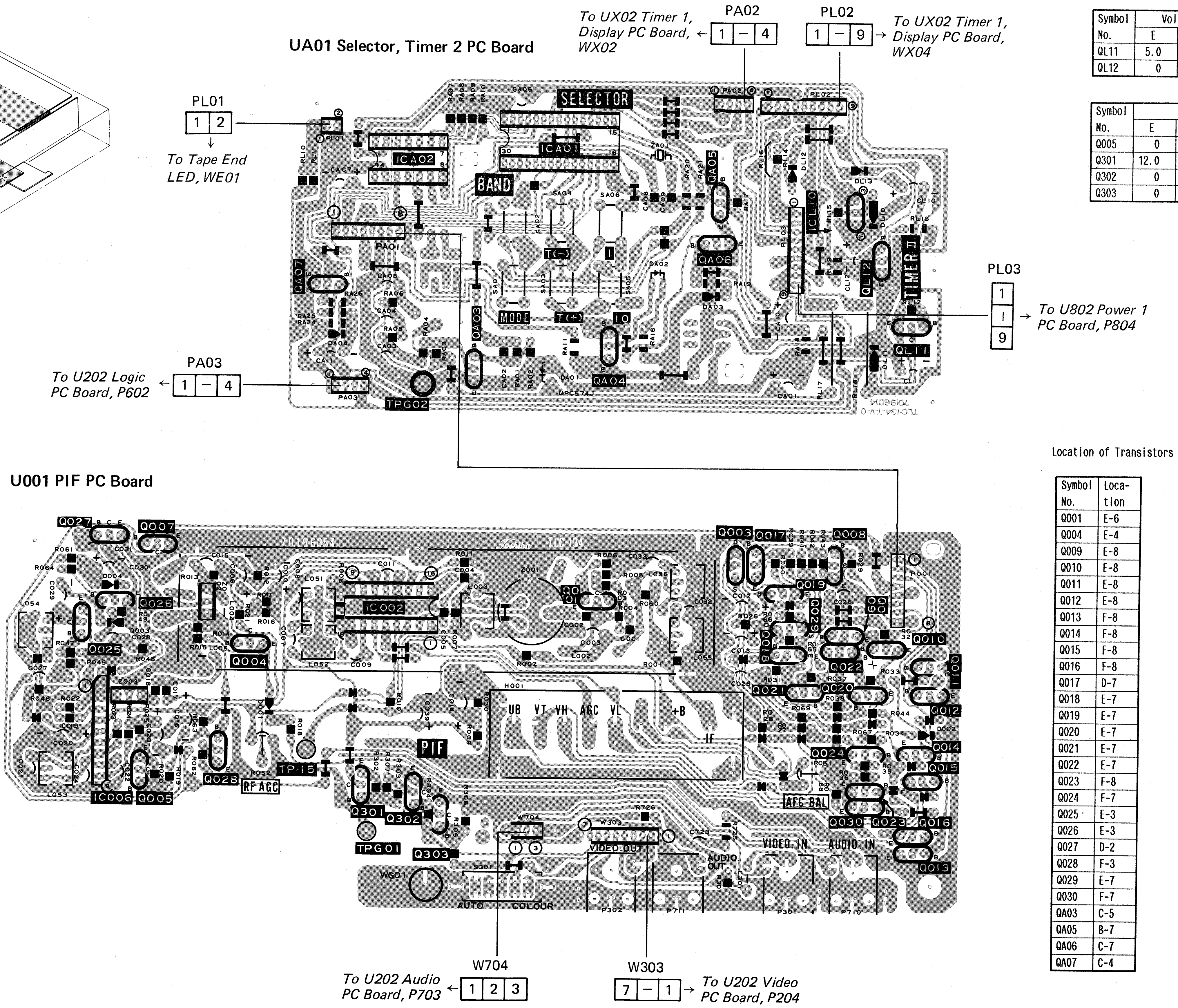
8-3. Power Supply Circuit


U802 POWER 1
NOTE:
V-81/83W Only
⚠23213657 or ⚠23213671
V-81/83G Only
⚠23213671
POWER TRANS FOMER T802
NOTE:
V-81/83W Only
C801 ⚠24095831B
V-81/83G Only
C801 ⚠70416068B
C802 ⚠70416068B
(V-81/83G Only)
LINE FILTER
C802
T801 ⚠ 23211997
⚠ 23144129 F801 250V T2A
C801 0.1 (250V)
L
N
TP811
TP812
P801
⚠ 23176740
⚠ 23144959 F802 250V T3.15A
⚠ 23118977 D801,D802 ERC01-02FL×2
D801
D802
D803
D804
D803,D804 1S1885×2 ⚠23115263
⚠ 23115263 D805 1S1885
C803 0.01 50V ×2 C804
D806 ⚠ 1S1885 23115263
⚠ 23144164 F803 250V T1.25A
24796222 ⚠ C805 2200μ (35V)
24796222 ⚠ C806 2200μ (35V)
⚠24794332 C807 3300μ (16V)
D808 ERA12-02
⚠24531220 FUSE-R
R801 22 1/2W
C809 47μ (100V)
D807 ERA12-02
R803 47K 1/6W
C808 47μ (100V)
U803 POWER 2
Q802 2SD1415 M+B OUTPUT
TP802 M+B
R812 1.2K 1/2W
Q803 2SC2458Y M+B OUTPUT CONT.
D822 1SS176
R819 12K 1/6W
C822 0.01μ (50V)
R811 16K 1/6W
R820 3.6K 1/6W
D819 05Z5.6X,Y,Z
PROTECTION OUTPUT DET Q808 RN1202
R818 15K 1/6W
TPG82 GND
C818 2.2μ (50V)
R825 12K 1/6W
Q809 2SA970-GR POWER ON/OFF OUTPUT
R826 10K 1/6W
R827 22K 1/6W
C817 4.7μ (100V)
Q807 2SC2240-GR POWER ON/OFF SW
R829 10K 1/6W
R822 10K 1/2W
R802 2.2K 2W
D809 05Z6.8Y
D810 05Z20Z
C811 22μ (25V)
Q810 RN1201 PROTECTION DRIVE
D820 1SS176
D818 1SS176
R828 10K 1/6W
R824 8.2K 1/6W
TP807 -28V
TP803 E12V
Q804 2SD1415 +12V OUTPUT
D821 1SS176
Q805 2SC2458Y +12V OUTPUT CONT.
R813 1.5K 1/6W
D815 05Z5.6Y
C812 0.01μ (50V)
R814 1.6K 1/6W
R815 2.2K 1/6W
24531100 ⚠ R816 10 1/2W FUSE-R
Q806 2SD1406Y E+12V OUTPUT
C814 22μ 25V
R817 750 1/2W
D816 1SS176×2 D814
C815 10μ 25V
D817 05Z12Z
P809
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮
C810 10μ (50V)
P804 (WHT)
1 EVER +12V WHT
2 F(AC 3.6V) ORG
3 F(AC 3.6V) ORG
4 VKK(−28V) ORG
5 GND ORG
6 POWER ON/OFF SG ORG
7 AC CLOCK ORG
8 RECT OUT −60V ORG
9 RECT OUT +60V ORG
TO PL03 OF UA01 TIMER 2 CIRCUIT
P803 (WHT)
1 DC +9V WHT
2 GND ORG
3 EVER +12V ORG
4 MOTOR GND ORG
5 MOTOR +B ORG
6 GND ORG
7 +12V ORG
8 DEW HEATER ON ORG
TO P601 OF U202 LOGIC CIRCUIT
R805 2.2K 1/6W
P805 (WHT)
1 DEW HEATER WHT
2 DEW HEATER BLU
TO DEW HEATER
R804 4.7K 1/6W
Q801 2SD549 DEW HEATER DRIVE
P802 (RED)
1 DC +9V WHT
2 GND ORG
3 +12V ORG
TO P201 OF U202 VIDEO CIRCUIT
R851 1K-B
C813 22μ (25V)
TP801 +12V
P806 (WHT)
1 +12V
2 NC
3 GND
(TEST CONNECTOR)
TPG81 GND

	Q801			Q802			Q803			Q804			Q805			Q806			Q807			Q808			Q809			Q810		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
STAND-BY	0.V	0.7V	1.3V	0.9V	19.9V	0.9V	0.V	0.V	0.7V	0.V	19.7V	0.V	0.V	0.V	0.V	12.1V	18.6V	12.8V	0.V	63.9V	0.V	0.V	0.V	4.2V	64.1V	0.V	64.1V	0.V	0.V	0.V
EE	0.V	0.7V	1.3V	13.6V	18.7V	14.6V	12.0V	15.3V	12.6V	12.0V	18.3V	13.2V	5.6V	13.7V	6.2V	12.0V	17.2V	12.7V	0.V	0.V	0.6V	0.V	0.V	6.0V	27.6V	27.6V	27.0V	0.V	27.6V	0.V
PLAY	0.V	18.3V	0.4V	13.5V	18.3V	14.8V	12.0V	15.3V	12.6V	12.0V	18.4V	13.2V	5.6V	13.6V	6.2V	12.0V	17.3V	12.7V	0.V	0.V	0.6V	0.V	0.V	6.0V	27.6V	27.6V	26.9V	0.V	27.6V	0.V
REC	0.V	17.7V	0.4V	13.5V	17.7V	14.8V	12.0V	15.3V	12.6V	12.0V	17.3V	13.2V	5.6V	13.7V	6.2V	12.0V	16.3V	12.6V	0.V	0.V	0.6V	0.V	0.V	6.0V	27.4V	27.4V	26.8V	0.V	27.4V	0.V

9-3. PIF, Selector, Timer 2 PC Board (V-81/83G)




1
2
3
4
5
6
7
8
9
10
11
A
B
C
D
E
F
G
UA01 Selector, Timer 2 PC Board
PL01
1 2
To Tape End LED, WE01
PA02
To UX02 Timer 1, Display PC Board, WX02
1 − 4
PL02
1 − 9
To UX02 Timer 1, Display PC Board, WX04
PL03
1 | 9
To U802 Power 1 PC Board, P804
PA03
To U202 Logic PC Board, P602
1 − 4
SELECTOR
BAND
ICA01
ICA02
PA01
QA07
QA03
QA04
QA05
QA06
ICL10
QL12
QL11
TIMER II
MODE
T(−)
T(+)
TPG02
U001 PIF PC Board
Q027
Q007
Q003
Q017
Q008
IC002
IC006
Q005
Q028
Q025
Q026
Q004
RF AGC
TP-15
PIF
UB VT VH AGC VL +B
IF
Q301
Q302
Q303
TPG01
WG01
S301
AUTO
COLOUR
VIDEO OUT
AUDIO OUT
VIDEO IN
AUDIO IN
AFC BAL
P302
P711
P301
P710
W704
To U202 Audio PC Board, P703
1 2 3
W303
7 − 1
To U202 Video PC Board, P204

Voltage and Location of Transistors

Symbol No.	Voltage(Unit:V)			Loca-tion
	E	C	B	
QL11	5.0	5.0	4.2	C-8
QL12	0	0	5.4	C-8

Symbol No.	$\overline{\text{PLAY}}$			PLAY			Loca-tion
	E	C	B	E	C	B	
Q005	0	OPEN	0	0	0	0	F-3
Q301	12.0	12.0	11.1	12.0	0	12.0	F-4
Q302	0	0	0.7	0	12.0	0	F-5
Q303	0	0.7	0	0	0	0	F-5

Q003

	AFC ON	AFC OFF	Location
S	6.6	6.6	D-7
D	6.6	6.6	
G	0	7.1	

Q007

	MUTE ON	MUTE OFF	Location
E	0	0	D-3
C	0	OPEN	
B	4.5	0	

Q008

	AFC ON	AFC OFF	Location
S	0	0	D-7
D	0	11.5	
G	0.6	0	

QA04

	AFC ON	AFC OFF	Location
E	5.0	5.0	C-6
C	OPEN	5.0	
B	5.0	0	

Location of Transistors

Symbol No.	Loca-tion
Q001	E-6
Q004	E-4
Q009	E-8
Q010	E-8
Q011	E-8
Q012	E-8
Q013	F-8
Q014	F-8
Q015	F-8
Q016	F-8
Q017	D-7
Q018	E-7
Q019	E-7
Q020	E-7
Q021	E-7
Q022	E-7
Q023	F-8
Q024	F-7
Q025	E-3
Q026	E-3
Q027	D-2
Q028	F-3
Q029	E-7
Q030	F-7
QA03	C-5
QA05	B-7
QA06	C-7
QA07	C-4

Location of VR'S

Symbol No.	Loca-tion
R051	F-7
R052	F-4

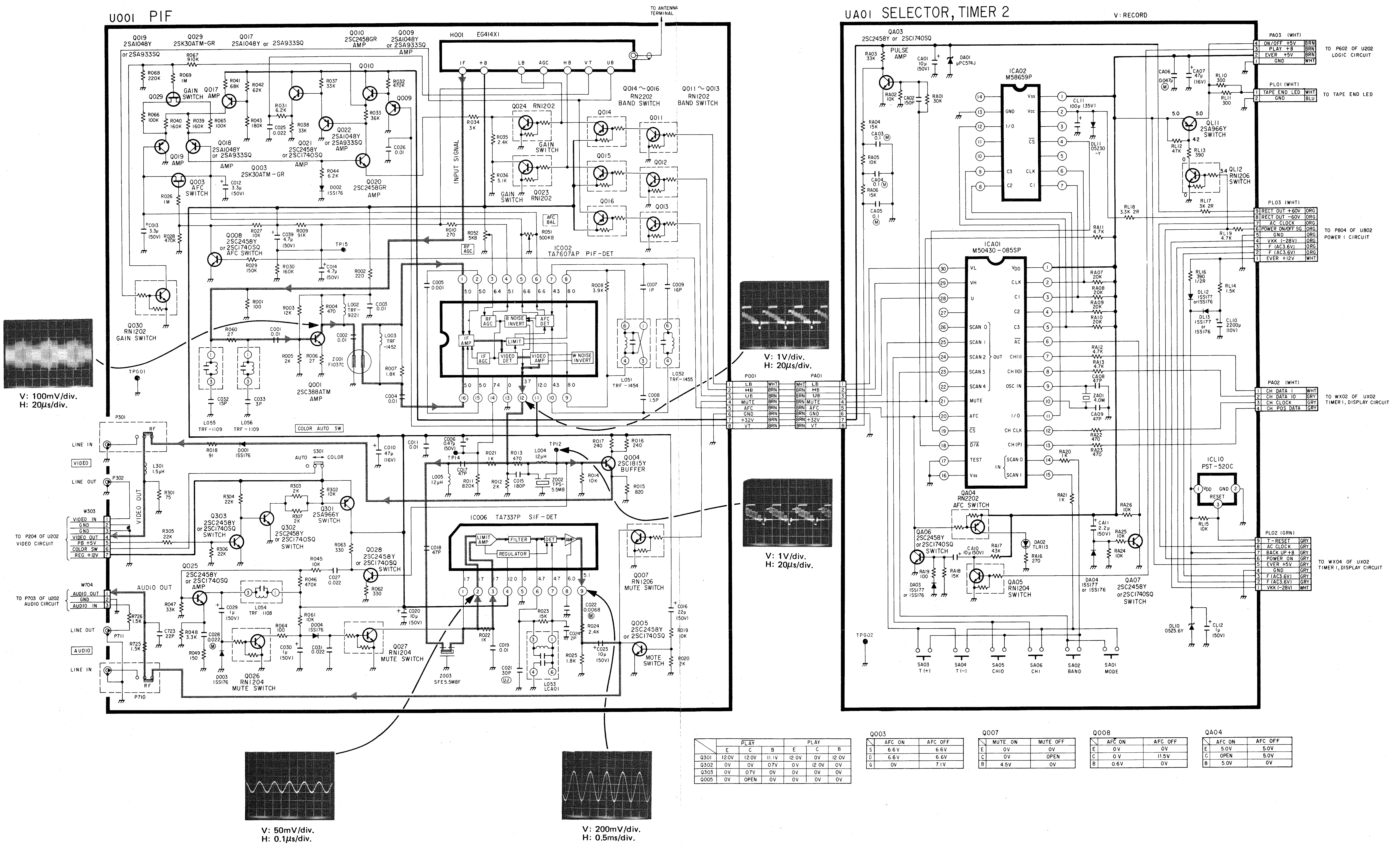
Location of IC'S

Symbol No.	Loca-tion
IC002	E-4
IC006	F-3
ICA01	B-6
ICA02	B-5
ICA10	B-7

Location of Diodes

Symbol No.	Loca-tion
D001	E-4
D002	F-8
D003	E-3
D004	E-3
DA01	C-6
DA02	C-6
DA03	C-7
DA04	C-4
DL10	B-8
DL11	C-8
DL12	B-7
DL13	B-8

9-4. PIF, Selector, Timer 2 Circuit (V-81/83G)


1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G
U001 PIF
UA01 SELECTOR, TIMER 2
V: RECORD
TO ANTENNA TERMINAL
H001 EG414X1
IF
+B
LB
AGC
HB
VT
UB
Q019 2SA1048Y or 2SA933SQ
Q029 2SK30ATM-GR
Q017 2SA1048Y or 2SA933SQ
Q010 2SC2458GR AMP
Q009 2SA1048Y or 2SA933SQ AMP
GAIN SWITCH
Q017 AMP
Q018 2SA1048Y or 2SA933SQ AMP
Q019 AMP
Q021 2SC2458Y or 2SC1740SQ AMP
Q022 2SA1048Y or 2SA933SQ AMP
Q020 2SC2458GR AMP
Q003 2SK30ATM-GR
Q003 AFC SWITCH
INPUT SIGNAL
Q024 RN1202
GAIN SWITCH
Q023 RN1202
Q014～Q016 RN2202 BAND SWITCH
Q011～Q013 RN1202 BAND SWITCH
Q014
Q015
Q016
Q011
Q012
Q013
Q008 2SC2458Y or 2SC1740SQ AFC SWITCH
TP15
RF AGC
AFC BAL
IC002 TA7607AP PIF-DET
RF AGC
B NOISE INVERT
AFC DET
IF AMP
LIMIT
IF AGC
VIDEO DET
VIDEO AMP
W NOISE INVERT
Q030 RN1202 GAIN SWITCH
Q001 2SC388ATM AMP
Z001 F1037C
L002 TRF-9221
L003 TRF-1452
L051 TRF-1454
L052 TRF-1455
L055 TRF-1109
L056 TRF-1109
TPG01
COLOR AUTO SW
P301
LINE IN
RF
VIDEO
LINE OUT
P302
VIDEO OUT
W303
VIDEO IN
GND
GND
VIDEO OUT
PB +5V
COLOR SW
REG +12V
TO P204 OF U202 VIDEO CIRCUIT
W704
AUDIO OUT
GND
AUDIO IN
TO P703 OF U202 AUDIO CIRCUIT
LINE OUT
P711
AUDIO
LINE IN
RF
P710
R726 1.5K
R725 1.5K
S301 AUTO COLOR
Q303 2SC2458Y or 2SC1740SQ SWITCH
Q302 2SC2458Y or 2SC1740SQ SWITCH
Q301 2SA966Y SWITCH
Q025 2SC2458Y or 2SC1740SQ AMP
Q028 2SC2458Y or 2SC1740SQ SWITCH
AUDIO OUT
L054 TRF 1108
Q026 RN1204 MUTE SWITCH
Q027 RN1204 MUTE SWITCH
TP14
TP12
Q004 2SC1815Y BUFFER
Z002 TPS-5.5MB
IC006 TA7337P SIF-DET
LIMIT AMP
FILTER
DET
REGULATOR
Q007 RN1206 MUTE SWITCH
Q005 2SC2458Y or 2SC1740SQ
MOTE SWITCH
Z003 SFE5.5MBF
L053 LCA01
P001
PA01
LB
HB
UB
MUTE
AFC
GND
+32V
VT
WHT
BRN
QA03 2SC2458Y or 2SC1740SQ
PULSE AMP
DA01 μPC574J
ICA02 M58659P
Vss
GND
Vcc
I/O
CS
C3
CLK
C2
C1
DL11 05Z30-Y
QL11 2SA966Y SWITCH
QL12 RN1206 SWITCH
PA03 (WHT)
ON/OFF +5V
PLAY +B
EVER +5V
GND
TO P602 OF U202 LOGIC CIRCUIT
PL01 (WHT)
TAPE END LED
GND
TO TAPE END LED
PL03 (WHT)
RECT OUT +60V
RECT OUT -60V
AC CLOCK
POWER ON/OFF SG
GND
VKK (-28V)
F (AC3.6V)
F (AC3.6V)
EVER +12V
ORG
TO P804 OF U802 POWER I CIRCUIT
ICA01 M50430-085SP
VL
VH
U
SCAN 0
SCAN 1
SCAN 2
SCAN 3
SCAN 4
OUT
MUTE
AFC
CS
D/A
TEST
Vss
VDD
CLK
C1
C2
C3
AC
CH(1)
CH(10)
OSC IN
I/O
CH CLK
CH(P)
IN
SCAN 0
SCAN 1
Z401 4.0M
DL12 1SS177 or 1SS176
DL13 1SS177 or 1SS176
PA02 (WHT)
CH DATA 1
CH DATA 10
CH CLOCK
CH POS DATA
GRY
TO WX02 OF UX02 TIMER I, DISPLAY CIRCUIT
ICL10 PST-520C
VDD
GND
RESET
QA04 RN2202 AFC SWITCH
QA06 2SC2458Y or 2SC1740SQ SWITCH
DA02 TLR113
QA05 RN1204 SWITCH
DA03 1SS177 or 1SS176
DA04 1SS177 or 1SS176
QA07 2SC2458Y or 2SC1740SQ SWITCH
DL10 05Z5.6Y
PL02 (GRN)
T-RESET
AC CLOCK
BACK UP +B
POWER ON
EVER +5V
GND
F (AC3.6V)
F (AC3.6V)
VKK (-28V)
TO WX04 OF UX02 TIMER I, DISPLAY CIRCUIT
TPG02
SA03 T(+)
SA04 T(-)
SA05 CH10
SA06 CH1
SA02 BAND
SA01 MODE

V: 100mV/div.
H: 20μs/div.

V: 1V/div.
H: 20μs/div.

V: 1V/div.
H: 20μs/div.

V: 50mV/div.
H: 0.1μs/div.

V: 200mV/div.
H: 0.5ms/div.

	$\overline{\text{PLAY}}$			PLAY		
	E	C	B	E	C	B
Q301	12.0V	12.0V	11.1V	12.0V	0V	12.0V
Q302	0V	0V	0.7V	0V	12.0V	0V
Q303	0V	0.7V	0V	0V	0V	0V
Q005	0V	OPEN	0V	0V	0V	0V

Q003

	AFC ON	AFC OFF
S	6.6V	6.6V
D	6.6V	6.6V
G	0V	7.1V

Q007

	MUTE ON	MUTE OFF
E	0V	0V
C	0V	OPEN
B	4.5V	0V

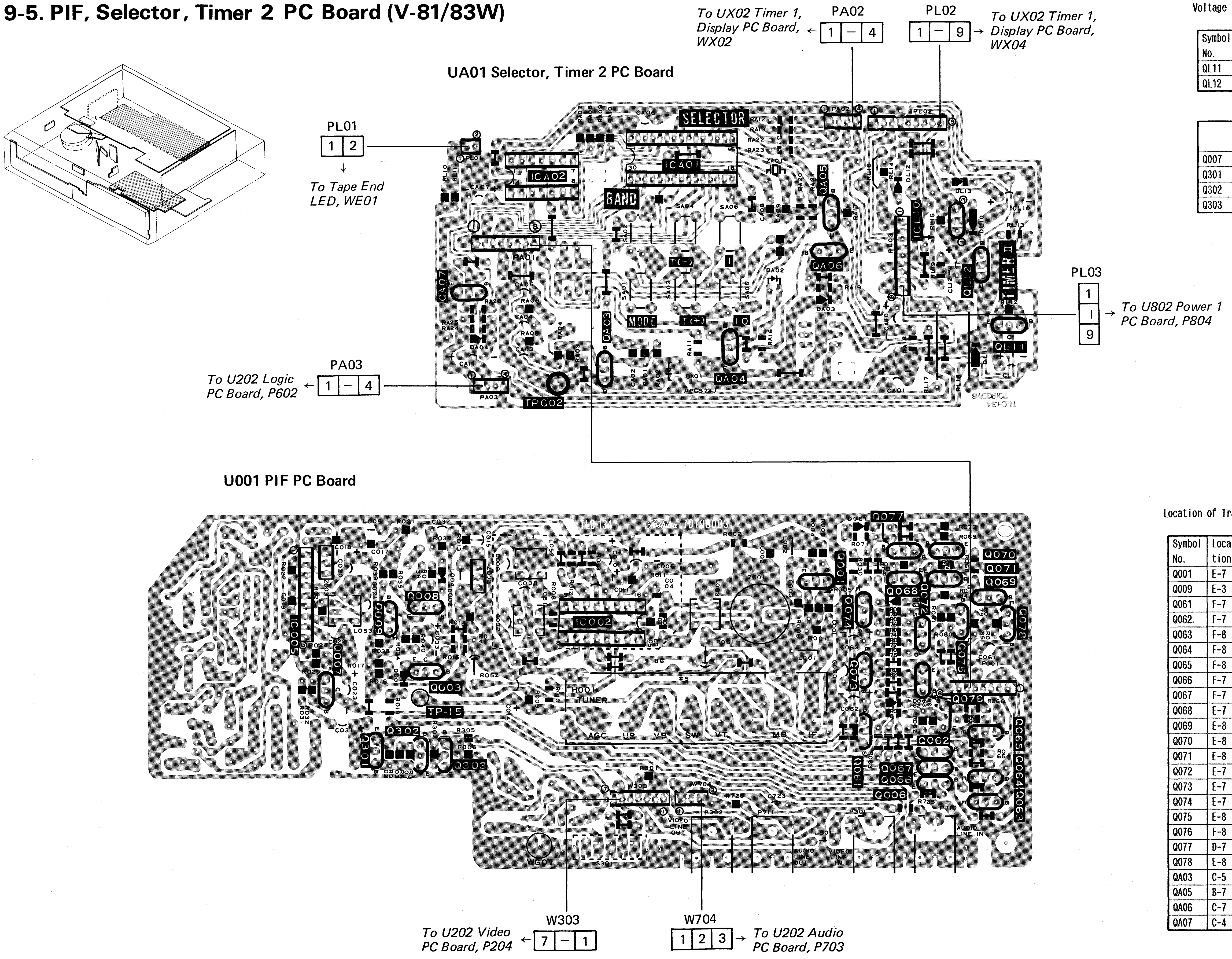
Q008

	AFC ON	AFC OFF
E	0V	0V
C	0V	11.5V
B	0.6V	0V

QA04

	AFC ON	AFC OFF
E	5.0V	5.0V
C	OPEN	5.0V
B	5.0V	0V

9-5. PIF, Selector, Timer 2 PC Board (V-81/83W)


1
2
3
4
5
6
7
8
9
10
11
A
B
C
D
E
F
G
UA01 Selector, Timer 2 PC Board
To UX02 Timer 1, Display PC Board, WX02
PA02
1 – 4
PL02
1 – 9
To UX02 Timer 1, Display PC Board, WX04
PL01
1 2
To Tape End LED, WE01
SELECTOR
BAND
MODE
TIMER II
PL03
1 | 9
To U802 Power 1 PC Board, P804
PA03
To U202 Logic PC Board, P602
1 – 4
TPG02
U001 PIF PC Board
TLC-134
Toshiba 70196003
H001 TUNER
AGC UB VB SW VT MB IF
TP-15
VIDEO LINE OUT
AUDIO LINE OUT
VIDEO LINE IN
AUDIO LINE IN
WG01
S301
W303
To U202 Video PC Board, P204
7 – 1
W704
1 2 3
To U202 Audio PC Board, P703

Voltage and Location of Transistors

Symbol No.	Voltage(Unit:V) E	C	B	Location
QL11	5.0	5.0	4.2	C-8
QL12	0	0	5.4	C-8

	$\overline{\text{PLAY}}$			PLAY			Location
	E	C	B	E	C	B	
Q007	0	OPEN	0	0	0	0	E-3
Q301	12.0	12.0	11.1	12.0	0	12.0	F-3
Q302	0	0	0.7	0	12.0	0	F-4
Q303	0	0.7	0	0	0	0	F-4

Q003

	AFC ON	AFC OFF	Location
S	8.5	6.3	E-4
D	4.1	6.2	
G	0	6.8	

Q006

	MUTE ON	MUTE OFF	Location
E	0	0	F-7
C	0	OPEN	
B	4.5	0	

Q008

	AFC ON	AFC OFF	Location
E	0	0	E-4
C	0	11.5	
B	0.7	0	

QA04

	AFC ON	AFC OFF	Location
E	5.1	5.1	C-6
C	OPEN	5.0	
B	4.6	0	

Location of Transistors

Symbol No.	Location
Q001	E-7
Q009	E-3
Q061	F-7
Q062	F-7
Q063	F-8
Q064	F-8
Q065	F-8
Q066	F-7
Q067	F-7
Q068	E-7
Q069	E-8
Q070	E-8
Q071	E-8
Q072	E-7
Q073	E-7
Q074	E-7
Q075	E-8
Q076	F-8
Q077	D-7
Q078	E-8
QA03	C-5
QA05	B-7
QA06	C-7
QA07	C-4

Location of VR'S

Symbol No.	Location
R051	E-6
R052	E-4

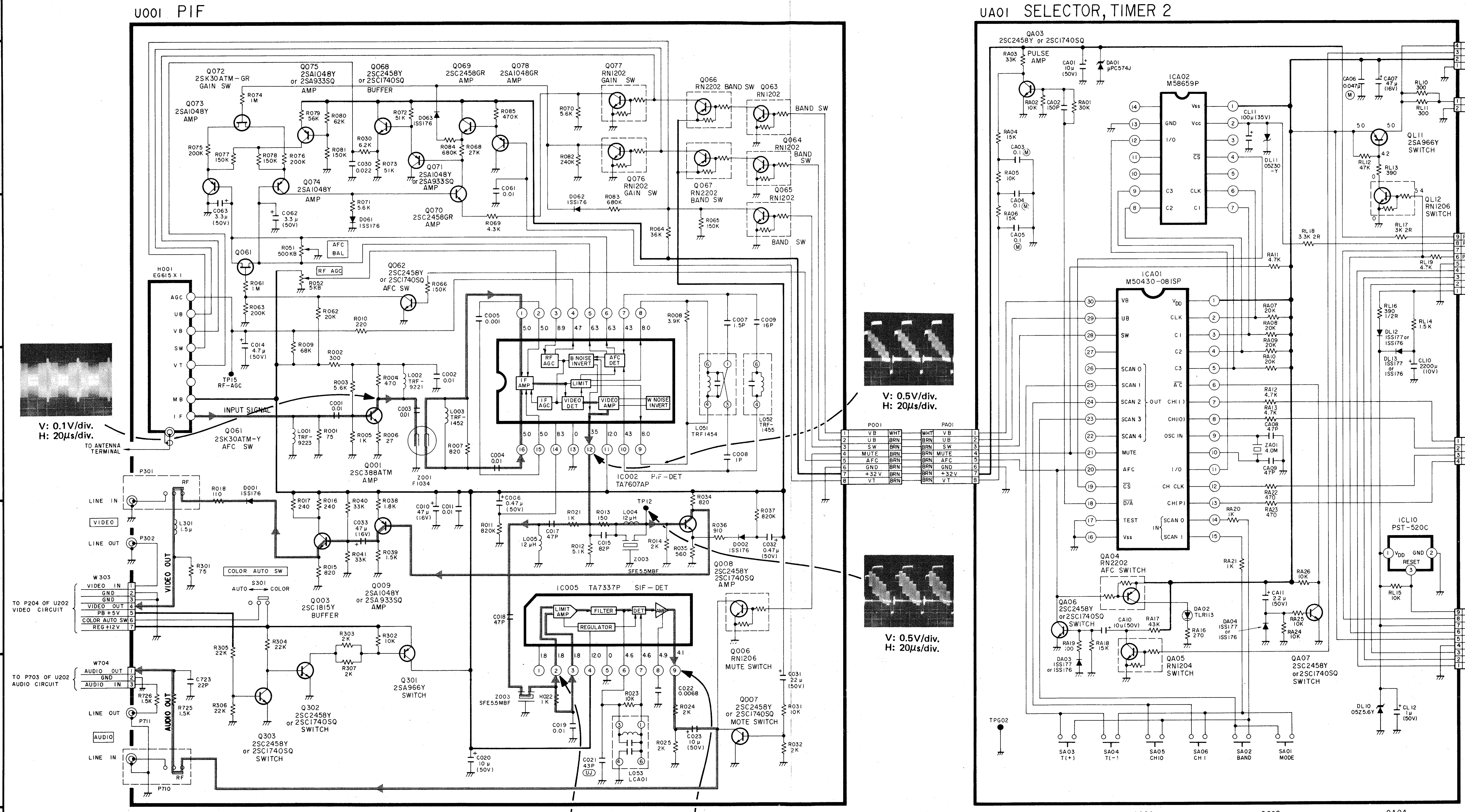
Location of IC'S

Symbol No.	Location
IC002	E-5
IC005	E-3
ICA01	B-6
ICA02	B-5
ICL10	B-7

Location of Diodes

Symbol No.	Location
D001	E-4
D002	E-4
D061	D-7
D062	F-7
D063	E-7
DA01	C-6
DA02	C-6
DA03	C-7
DA04	C-4
DL10	B-8
DL11	C-8
DL12	B-7
DL13	B-8

9-6. PIF, Selector, Timer 2 Circuit (V-81/83W)


U001 PIF
UA01 SELECTOR, TIMER 2
Q072 2SK30ATM-GR GAIN SW
Q073 2SA1048Y AMP
Q075 2SA1048Y or 2SA933SQ AMP
Q074 2SA1048Y AMP
Q068 2SC2458Y or 2SC1740SQ BUFFER
Q069 2SC2458GR AMP
Q078 2SA1048GR AMP
Q071 2SA1048Y or 2SA933SQ AMP
Q070 2SC2458GR AMP
Q077 RN1202 GAIN SW
Q076 RN1202 GAIN SW
Q066 RN2202 BAND SW
Q063 RN1202 BAND SW
Q064 RN1202 BAND SW
Q067 RN2202 BAND SW
Q065 RN1202 BAND SW
Q061 2SK30ATM-Y AFC SW
Q062 2SC2458Y or 2SC1740SQ AFC SW
AFC BAL
RF AGC
H001 EG615 X I
AGC
UB
VB
SW
VT
MB
IF
TP15 RF-AGC
INPUT SIGNAL
Q001 2SC388ATM AMP
Z001 F1034
IC002 PIF-DET TA7607AP
RF AGC
B NOISE INVERT
AFC DET
IF AMP
LIMIT
IF AGC
VIDEO DET
VIDEO AMP
W NOISE INVERT
L051 TRF1454
L052 TRF-1455
TO ANTENNA TERMINAL
V: 0.1V/div.
H: 20μs/div.
P301
LINE IN
VIDEO
LINE OUT
P302
VIDEO OUT
W303
VIDEO IN
GND
GND
VIDEO OUT
PB +5V
COLOR AUTO SW
REG +12V
TO P204 OF U202 VIDEO CIRCUIT
COLOR AUTO SW
S301
AUTO ←→ COLOR
Q003 2SC1815Y BUFFER
Q009 2SA1048Y or 2SA933SQ AMP
TP12
Q008 2SC2458Y 2SC1740SQ AMP
Z003 SFE5.5MBF
IC005 TA7337P SIF-DET
LIMIT AMP
FILTER
DET
AMP
REGULATOR
Q006 RN1206 MUTE SWITCH
Q007 2SC2458Y or 2SC1740SQ MOTE SWITCH
L053 LCA01
W704
AUDIO OUT
GND
AUDIO IN
TO P703 OF U202 AUDIO CIRCUIT
LINE OUT
P711
AUDIO
LINE IN
P710
AUDIO OUT
Q302 2SC2458Y or 2SC1740SQ SWITCH
Q303 2SC2458Y or 2SC1740SQ SWITCH
Q301 2SA966Y SWITCH
V: 0.5V/div.
H: 20μs/div.
V: 0.5V/div.
H: 20μs/div.
P001
VB
UB
SW
MUTE
AFC
GND
+32V
VT
PA01
QA03 2SC2458Y or 2SC1740SQ PULSE AMP
DA01 μPC574J
ICA02 M58659P
Vss
Vcc
I/O
CS
CLK
C1
C2
C3
GND
DL11 05Z30-Y
ICA01 M50430-081SP
VB
UB
SW
SCAN 0
SCAN 1
SCAN 2
SCAN 3
SCAN 4
MUTE
AFC
CS
D/A
TEST
Vss
VDD
CLK
C1
C2
C3
AC
OUT CH(1)
CH(10)
OSC IN
I/O
CH CLK
CH(P)
IN SCAN 0
SCAN 1
QL11 2SA966Y SWITCH
QL12 RN1206 SWITCH
PA03 (WHT)
ON/OFF +5V
PLAY +B
EVER +5V
GND
TO P602 OF U202 LOGIC CIRCUIT
PL01 (WHT)
TAPE END LED
GND
TO TAPE END LED
PL03 (WHT)
RECT OUT +60V
RECT OUT -60V
AC CLOCK
POWER ON/OFF SG
GND
VKK (-28V)
F (AC3.6V)
F (AC3.6V)
EVER +12V
TO P804 OF U802 POWER 1 CIRCUIT
PA02 (WHT)
CH DATA 1
CH DATA 10
CH CLOCK
CH POS DATA
TO WX02 OF UX02 TIMER 1, DISPLAY CIRCUIT
ICL10 PST-520C
VDD GND RESET
PL02 (GRN)
T-RESET
AC CLOCK
BACK UP +B
POWER ON
EVER +5V
GND
F (AC3.6V)
F (AC3.6V)
VKK (-28V)
TO WX04 OF UX02 TIMER 1, DISPLAY CIRCUIT
QA04 RN2202 AFC SWITCH
QA06 2SC2458Y or 2SC1740SQ SWITCH
QA05 RN1204 SWITCH
QA07 2SC2458Y or 2SC1740SQ SWITCH
DA02 TLR113
TPG02
SA03 T(+)
SA04 T(-)
SA05 CH10
SA06 CH 1
SA02 BAND
SA01 MODE

	$\overline{\text{PLAY}}$			PLAY		
	E	C	B	E	C	B
Q301	12.0V	12.0V	11.1V	12.0V	0V	12.0V
Q302	0V	0V	0.7V	0V	12.0V	0V
Q303	0V	0.7V	0V	0V	0V	0V
Q007	0V	OPEN	0V	0V	0V	0V

Q003

	AFC ON	AFC OFF
S	8.5V	6.3V
D	4.1 V	6.2V
G	0V	6.8V

Q006

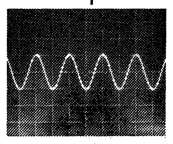
	MUTE ON	MUTE OFF
E	0V	0V
C	0V	OPEN
B	4.5V	0V

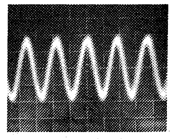
Q008

	AFC ON	AFC OFF
E	0V	0V
C	0V	11.5V
B	0.7V	0V

QA04

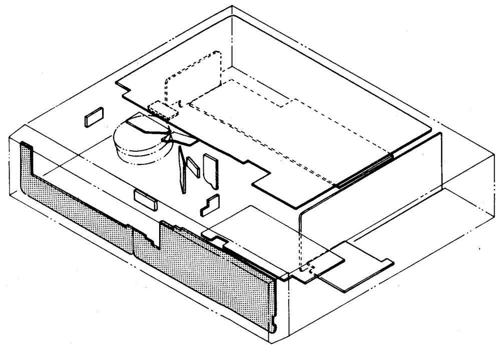
	AFC ON	AFC OFF
E	5.1V	5.1V
C	OPEN	5.0V
B	4.6V	0V

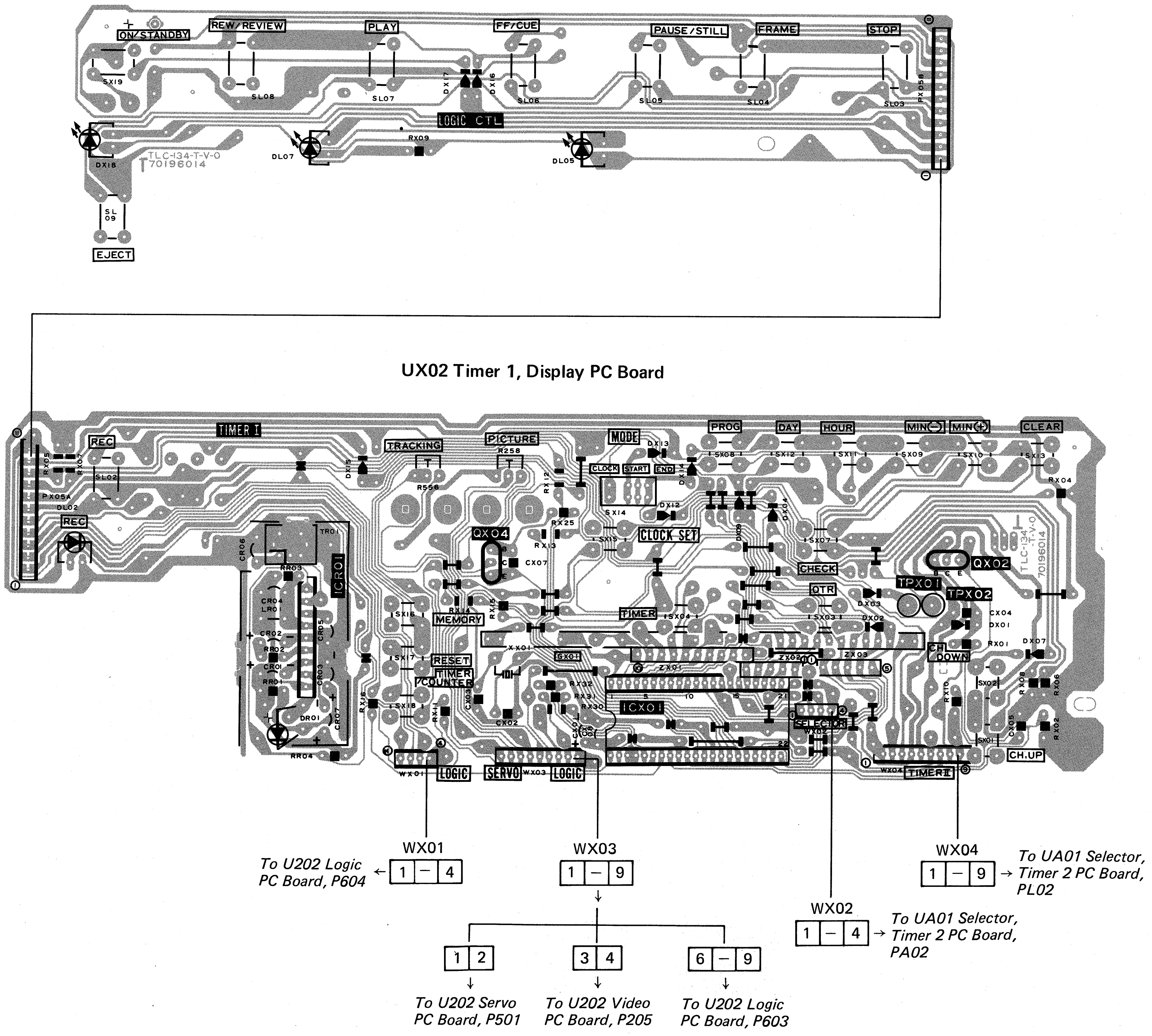

V: 0.5V/div.
H: 1ms/div.


V: 10mV/div.
H: 0.1μs/div.

V: RECORD (V)

10-3. Timer 1, Display, Logic Control Switch PC Board (V-81G/W)





UL01 Logic Control Switch PC Board

UX02 Timer 1, Display PC Board

ON/STANDBY
REW/REVIEW
PLAY
FF/CUE
PAUSE/STILL
FRAME
STOP
EJECT
LOGIC CTL
SL08
SL07
SL06
SL05
SL04
SL03
SL09
SX19
DX17
DX16
DX18
DL07
DL05
RX09
PX05B
TLC-134-T-V-0
70196014
TIMER I
REC
TRACKING
PICTURE
R258
R556
MODE
PROG
DAY
HOUR
MIN(−)
MIN(+)
CLEAR
CLOCK
START
END
CLOCK SET
CHECK
OTR
TIMER
MEMORY
RESET
TIMER/COUNTER
QX04
QX02
TPX01
TPX02
ICR01
ICX01
SELECTOR
CH DOWN
CH.UP
LOGIC
SERVO
TIMER II
DL02
DR01
WX01
To U202 Logic PC Board, P604
1 − 4
WX03
1 − 9
1 2
To U202 Servo PC Board, P501
3 4
To U202 Video PC Board, P205
6 − 9
To U202 Logic PC Board, P603
WX02
1 − 4
To UA01 Selector, Timer 2 PC Board, PA02
WX04
1 − 9
To UA01 Selector, Timer 2 PC Board, PL02

Voltage and Location of Transistors

Symbol No.	Voltage(Unit:V)			Location
	E	B	C	
QX02	—	—	5.2	E-9
QX04	0	0	4.7	E-6

Location of Diodes

Symbol No.	Location
DL02	D-3
DL05	B-6
DL07	B-5
DR01	F-5
DX01	E-9
DX02	E-8
DX03	E-8
DX04	D-8
DX07	E-9
DX09	E-7
DX12	D-7
DX13	D-7
DX14	D-7
DX15	D-5
DX16	B-6
DX17	B-6
DX18	B-4

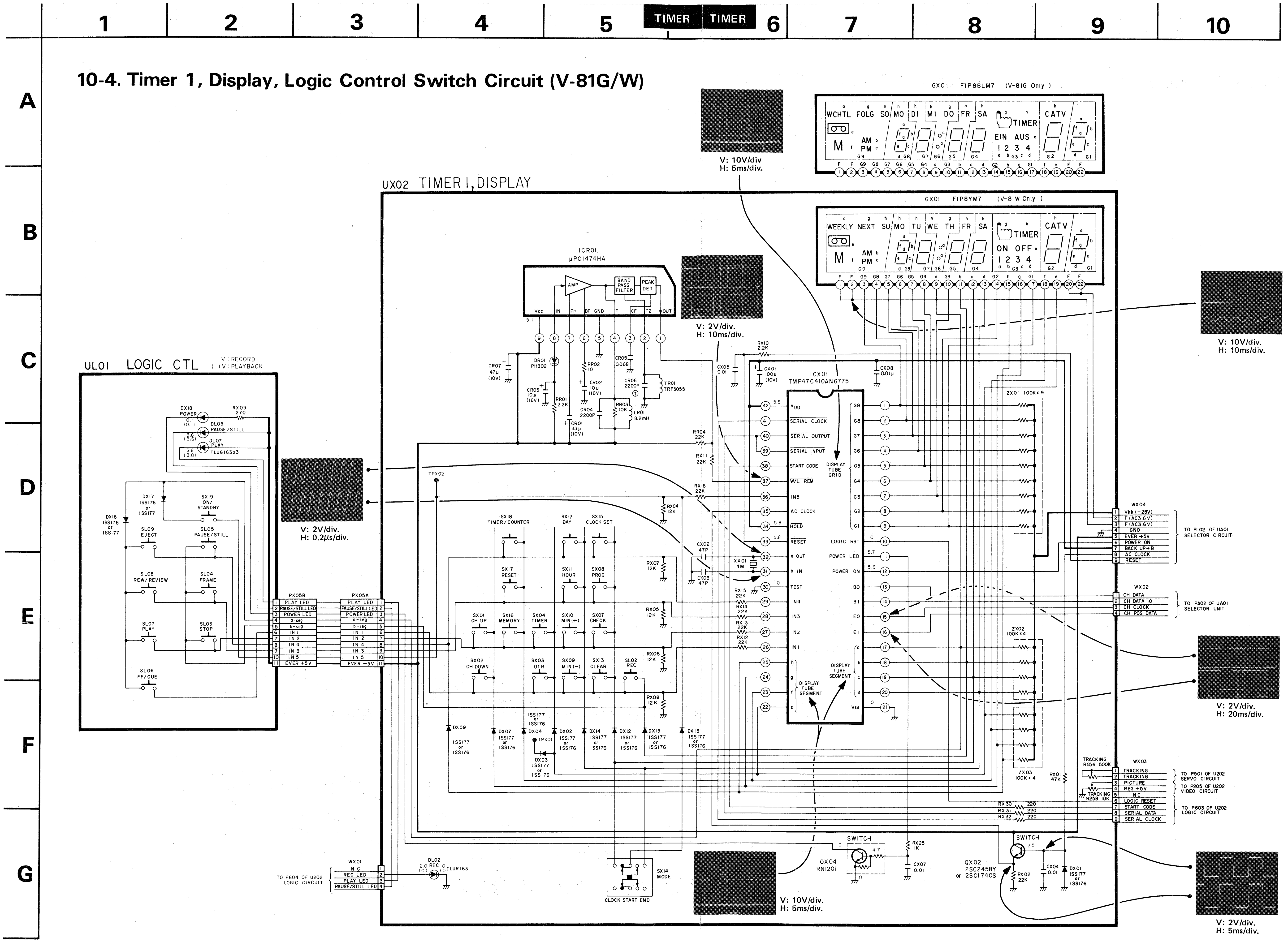
Location of VR'S

Symbol No.	Location
R258	D-6
R556	D-5

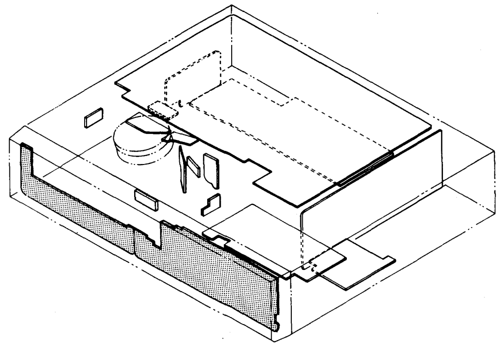
Location of IC'S

Symbol No.	Location
ICX01	F-7
ICR01	E-5

10-4. Timer 1, Display, Logic Control Switch Circuit (V-81G/W)

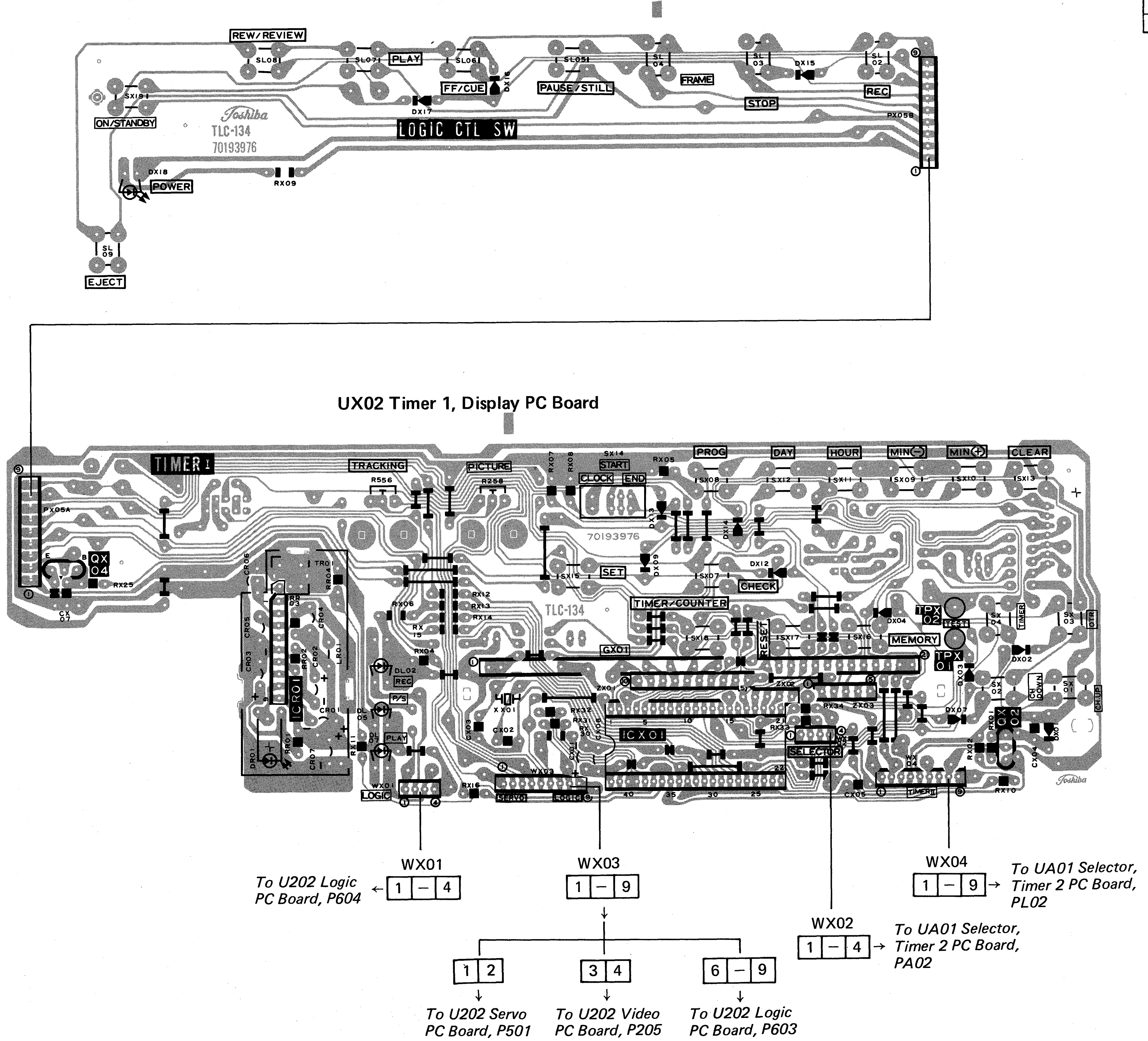

1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G
UX02 TIMER I, DISPLAY
UL01 LOGIC CTL
V: RECORD
( ) V: PLAYBACK
GX01 FIP8BLM7 (V-81G Only)
GX01 FIP8YM7 (V-81W Only)
WCHTL FOLG SO MO DI MI DO FR SA
TIMER
CATV
EIN AUS
WEEKLY NEXT SU MO TU WE TH FR SA
ON OFF
AM
PM
1 2 3 4
ICR01
μPC1474HA
AMP
BAND PASS FILTER
PEAK DET
ICX01
TMP47C410AN6775
VDD
SERIAL CLOCK
SERIAL OUTPUT
SERIAL INPUT
START CODE
W/L REM
IN5
AC CLOCK
HOLD
RESET
X OUT
X IN
TEST
IN4
IN3
IN2
IN1
DISPLAY TUBE GRID
DISPLAY TUBE SEGMENT
LOGIC RST
POWER LED
POWER ON
Vss
ZX01 100K x 9
ZX02 100K x 4
ZX03 100K x 4
XX01 4M
SX18 TIMER/COUNTER
SX12 DAY
SX15 CLOCK SET
SX17 RESET
SX11 HOUR
SX08 PROG
SX01 CH UP
SX16 MEMORY
SX04 TIMER
SX10 MIN (+)
SX07 CHECK
SX02 CH DOWN
SX03 OTR
SX09 MIN (−)
SX13 CLEAR
SL02 REC
SX14 MODE
CLOCK START END
SX19 ON/STANDBY
SL09 EJECT
SL05 PAUSE/STILL
SL08 REW/REVIEW
SL04 FRAME
SL07 PLAY
SL03 STOP
SL06 FF/CUE
DX18 POWER
DL05 PAUSE/STILL
DL07 PLAY
TLUG163x3
PX05B
PX05A
PLAY LED
PAUSE/STILL LED
POWER LED
a-seg
b-seg
IN 1
IN 2
IN 4
IN 3
IN 5
EVER +5V
WX01
TO P604 OF U202 LOGIC CIRCUIT
N C
REC LED
PLAY LED
PAUSE/STILL LED
DL02 REC TLUR163
WX04
Vkk (−28V)
F (AC3.6V)
F (AC3.6V)
GND
EVER +5V
POWER ON
BACK UP + B
AC CLOCK
RESET
TO PL02 OF UA01 SELECTOR CIRCUIT
WX02
CH DATA I
CH DATA IO
CH CLOCK
CH POS DATA
TO PA02 OF UA01 SELECTOR UNIT
WX03
TRACKING
TRACKING
PICTURE
REG +5V
N C
LOGIC RESET
START CODE
SERIAL DATA
SERIAL CLOCK
TO P501 OF U202 SERVO CIRCUIT
TO P205 OF U202 VIDEO CIRCUIT
TO P603 OF U202 LOGIC CIRCUIT
TRACKING R556 500K
TRACKING R258 10K
SWITCH
QX04 RN1201
QX02 2SC2458Y or 2SC1740S
DX01 1SS177 or 1SS176
V: 10V/div H: 5ms/div.
V: 2V/div. H: 10ms/div.
V: 10V/div. H: 10ms/div.
V: 2V/div. H: 0.2μs/div.
V: 2V/div. H: 20ms/div.
V: 10V/div. H: 5ms/div.
V: 2V/div. H: 5ms/div.

10-5. Timer 1, Display, Logic Control Switch PC Board (V-83G/W)



UL01 Logic Control Switch PC Board

UX02 Timer 1, Display PC Board


REW/REVIEW
SL08
SL07
PLAY
SL06
FF/CUE
DX16
DX17
SL05
PAUSE/STILL
SL04
FRAME
SL03
STOP
DX15
SL02
REC
PX05B
SX19
ON/STANDBY
Toshiba
TLC-134
70193976
LOGIC CTL SW
DX18
POWER
RX09
SL09
EJECT
TIMER 1
TRACKING
R556
PICTURE
R258
RX07
RX08
SX14
START
CLOCK
END
RX05
PROG
DAY
HOUR
MIN(−)
MIN(+)
CLEAR
SX08
SX12
SX11
SX09
SX10
SX13
PX05A
QX04
RX25
CX07
CR06
TR01
RR03
RR04
DX13
DX14
DX09
70193976
DX12
SX15
SET
SX07
CHECK
RX06
RX12
RX13
RX14
RX15
RX04
TIMER/COUNTER
TLC-134
SX16
RESET
SX17
SX16
DX04
TPX02
TEST
SX04
TIMER
SX03
OTR
MEMORY
TPX01
DX02
GX01
CR05
CR03
CR04
RR02
CR02
LR01
ICR01
CR01
DL02
REC
P/S
DL05
DL07
PLAY
RX11
DR01
RR01
CR07
XX01
CX02
CX05
ZX01
RX32
RX31
RX30
CX01
ICX01
RX33
RX34
ZX03
ZX02
SELECTOR
DX03
DX07
RX01
QX02
RX02
SX02
CH DOWN
SX01
CH UP
DX01
CX04
WX01
LOGIC
RX16
WX03
SERVO
LOGIC
CX06
WX04
TIMER2
RX10
Toshiba
WX01
To U202 Logic PC Board, P604
1 − 4
WX03
1 − 9
1 2
To U202 Servo PC Board, P501
3 4
To U202 Video PC Board, P205
6 − 9
To U202 Logic PC Board, P603
WX02
1 − 4
To UA01 Selector, Timer 2 PC Board, PA02
WX04
1 − 9
To UA01 Selector, Timer 2 PC Board, PL02

Voltage and Location of Transistors

Symbol No.	Voltage(Unit:V)			Location
	E	B	C	
QX02	—	—	5.2	E-9
QX04	0	0	4.7	D-4

Location of Diodes

Symbol No.	Location
DL02	E-5
DL05	E-5
DL07	E-5
DR01	F-4
DX01	E-9
DX02	E-9
DX03	E-9
DX04	E-8
DX07	E-9
DX09	D-7
DX12	D-8
DX13	D-8
DX14	D-7
DX15	B-8
DX16	B-6
DX17	B-6
DX18	B-4

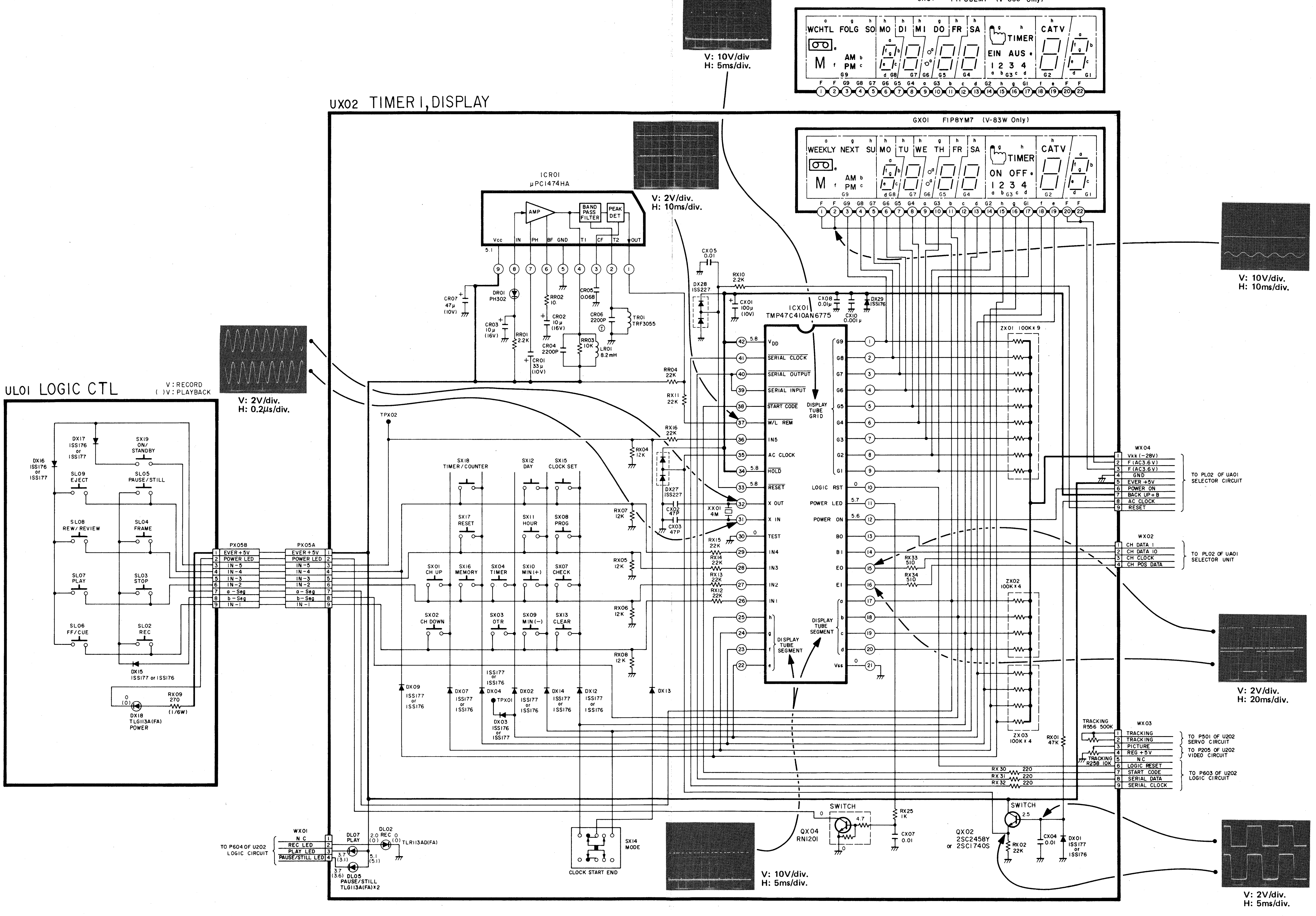
Location of VR'S

Symbol No.	Location
R258	D-6
R556	D-5

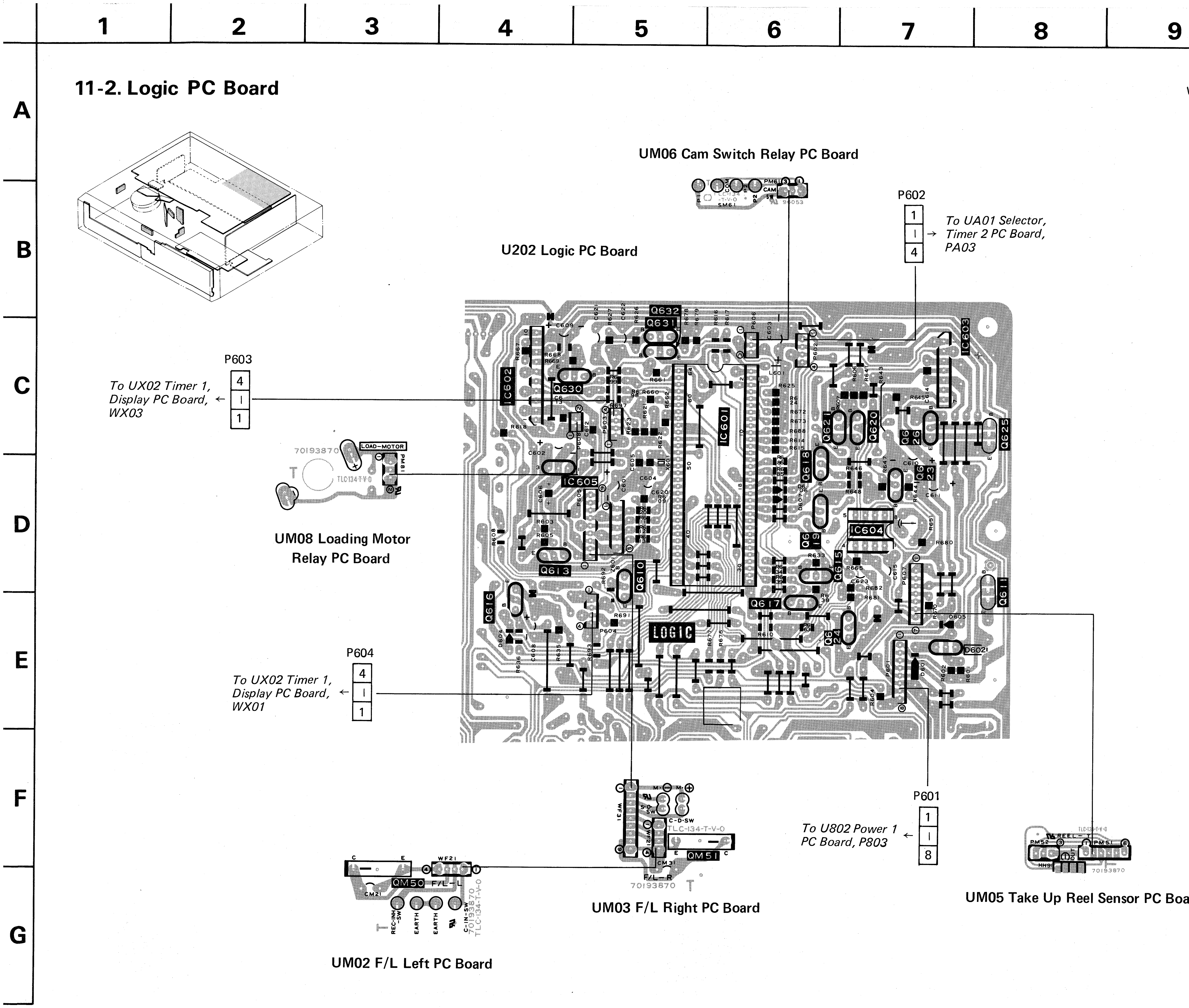
Location of IC'S

Symbol No.	Location
ICR01	E-5
ICX01	E-7

10-6. Timer 1. Display, Logic Control Switch Circuit (V-83G/W)


A
B
C
D
E
F
G
GX01 FIP8BLM7 (V-83G Only)
WCHTL FOLG SO MO DI MI DO FR SA
TIMER
EIN AUS
CATV
GX01 FIP8YM7 (V-83W Only)
WEEKLY NEXT SU MO TU WE TH FR SA
TIMER
ON OFF
CATV
AM
PM
V: 10V/div.
H: 5ms/div.
UX02 TIMER 1, DISPLAY
ICR01
μPC1474HA
AMP
BAND PASS FILTER
PEAK DET
V: 2V/div.
H: 10ms/div.
ICX01
TMP47C410AN6775
VDD
SERIAL CLOCK
SERIAL OUTPUT
SERIAL INPUT
START CODE
W/L REM
IN5
AC CLOCK
HOLD
RESET
X OUT
X IN
TEST
IN4
IN3
IN2
IN1
DISPLAY TUBE GRID
DISPLAY TUBE SEGMENT
LOGIC RST
POWER LED
POWER ON
B0
B1
E0
E1
Vss
ZX01 100K×9
ZX02 100K×4
ZX03 100K×4
XX01 4M
TR01 TRF3055
DR01 PH302
LR01 8.2mH
V: 10V/div.
H: 10ms/div.
UL01 LOGIC CTL
V: RECORD
( ) V: PLAYBACK
V: 2V/div.
H: 0.2μs/div.
TPX02
SX19 ON/STANDBY
SL09 EJECT
SL05 PAUSE/STILL
SL08 REW/REVIEW
SL04 FRAME
SL07 PLAY
SL03 STOP
SL06 FF/CUE
SL02 REC
DX15 ISS177 or ISS176
DX18 TLG113A(FA) POWER
RX09 270 (1/6W)
PX05B
PX05A
EVER+5V
POWER LED
IN-5
IN-4
IN-3
IN-2
a-Seg
b-Seg
IN-1
SX18 TIMER/COUNTER
SX12 DAY
SX15 CLOCK SET
SX17 RESET
SX11 HOUR
SX08 PROG
SX01 CH UP
SX16 MEMORY
SX04 TIMER
SX10 MIN(+)
SX07 CHECK
SX02 CH DOWN
SX03 OTR
SX09 MIN(−)
SX13 CLEAR
SX14 MODE
CLOCK START END
WX04
Vkk(−28V)
F(AC3.6V)
F(AC3.6V)
GND
EVER +5V
POWER ON
BACK UP +B
AC CLOCK
RESET
TO PL02 OF UA01 SELECTOR CIRCUIT
WX02
CH DATA I
CH DATA IO
CH CLOCK
CH POS DATA
TO PL02 OF UA01 SELECTOR UNIT
V: 2V/div.
H: 20ms/div.
WX03
TRACKING R556 500K
TRACKING
TRACKING
PICTURE
REG +5V
NC
LOGIC RESET
START CODE
SERIAL DATA
SERIAL CLOCK
TRACKING R258 10K
TO P501 OF U202 SERVO CIRCUIT
TO P205 OF U202 VIDEO CIRCUIT
TO P603 OF U202 LOGIC CIRCUIT
WX01
N C
REC LED
PLAY LED
PAUSE/STILL LED
TO P604 OF U202 LOGIC CIRCUIT
DL07 PLAY
DL02 REC
TLR113AD(FA)
DL05 PAUSE/STILL TLG113A(FA)×2
SWITCH
QX04 RN1201
QX02 2SC2458Y or 2SC1740S
V: 10V/div.
H: 5ms/div.
V: 2V/div.
H: 5ms/div.

11-2. Logic PC Board


1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
G
UM06 Cam Switch Relay PC Board
P602
1
|
4
To UA01 Selector, Timer 2 PC Board, PA03
U202 Logic PC Board
P603
4
|
1
To UX02 Timer 1, Display PC Board, WX03
LOAD-MOTOR
UM08 Loading Motor Relay PC Board
P604
4
|
1
To UX02 Timer 1, Display PC Board, WX01
IC601
IC602
IC603
IC604
IC605
LOGIC
P601
1
|
8
To U802 Power 1 PC Board, P803
UM05 Take Up Reel Sensor PC Board
UM03 F/L Right PC Board
UM02 F/L Left PC Board
QM50
QM51
REC-INH-SW
EARTH
C-IN-SW
C-D-SW

Voltage and Location of Transistors

Symbol No.	Voltage(Unit:V)			Loca-tion
	E	C	B	
Q610	5.1	5.0(0)	0.1(5.1)	D-5
Q611	5.2	8.9	6.5	D-8
Q613	0	5.1	0	D-4
Q615	5.1	0(5.1)	5.1(4.5)	D-7
Q616	12.0	11.9(0)	11.2(12.0)	E-4
Q617	5.1	0.3(5.1)	5.1(4.5)	E-6
Q618	0	2.3	1.0	D-6
Q619	0	3.4	0	D-6
Q620	0	0.4	0.1	C-7
Q621	0	0.1	1.8	C-6
Q623	0	3.7	0.2	D-7
Q624	0	0	4.9	E-7
Q625	13.2	3.1	12.6	C-8
Q626	3.1	12.6	3.7	C-7
Q630	0	7.9	0	C-4
Q631	4.3	5.2	4.9	C-5
Q632	4.2	5.2	4.8	B-5

Location of Diodes

Symbol No.	Loca-tion
D601	E-7
D602	E-7
D604	E-4
D605	E-7
D606	D-6
D607	D-6

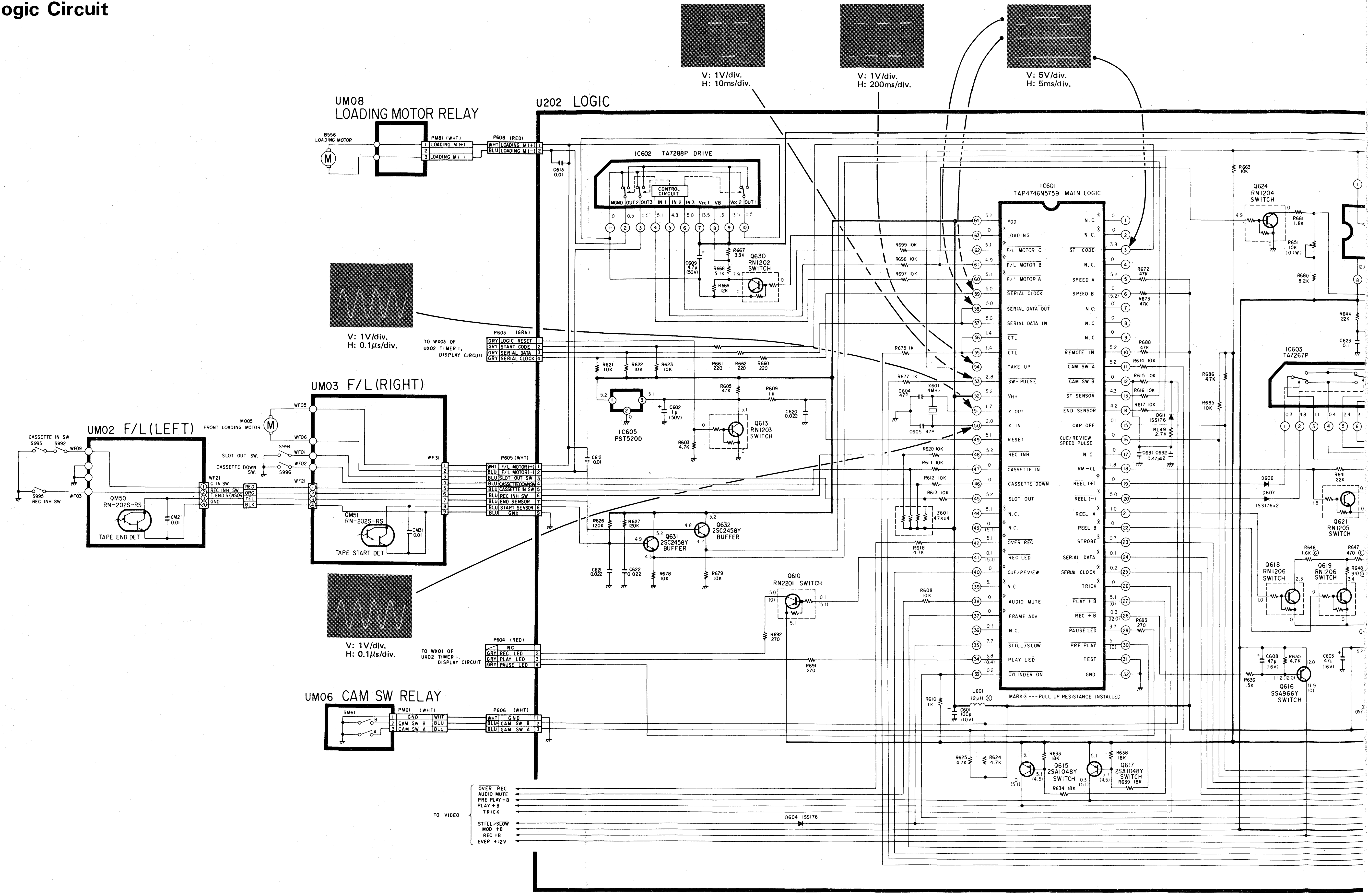
Location of VR's

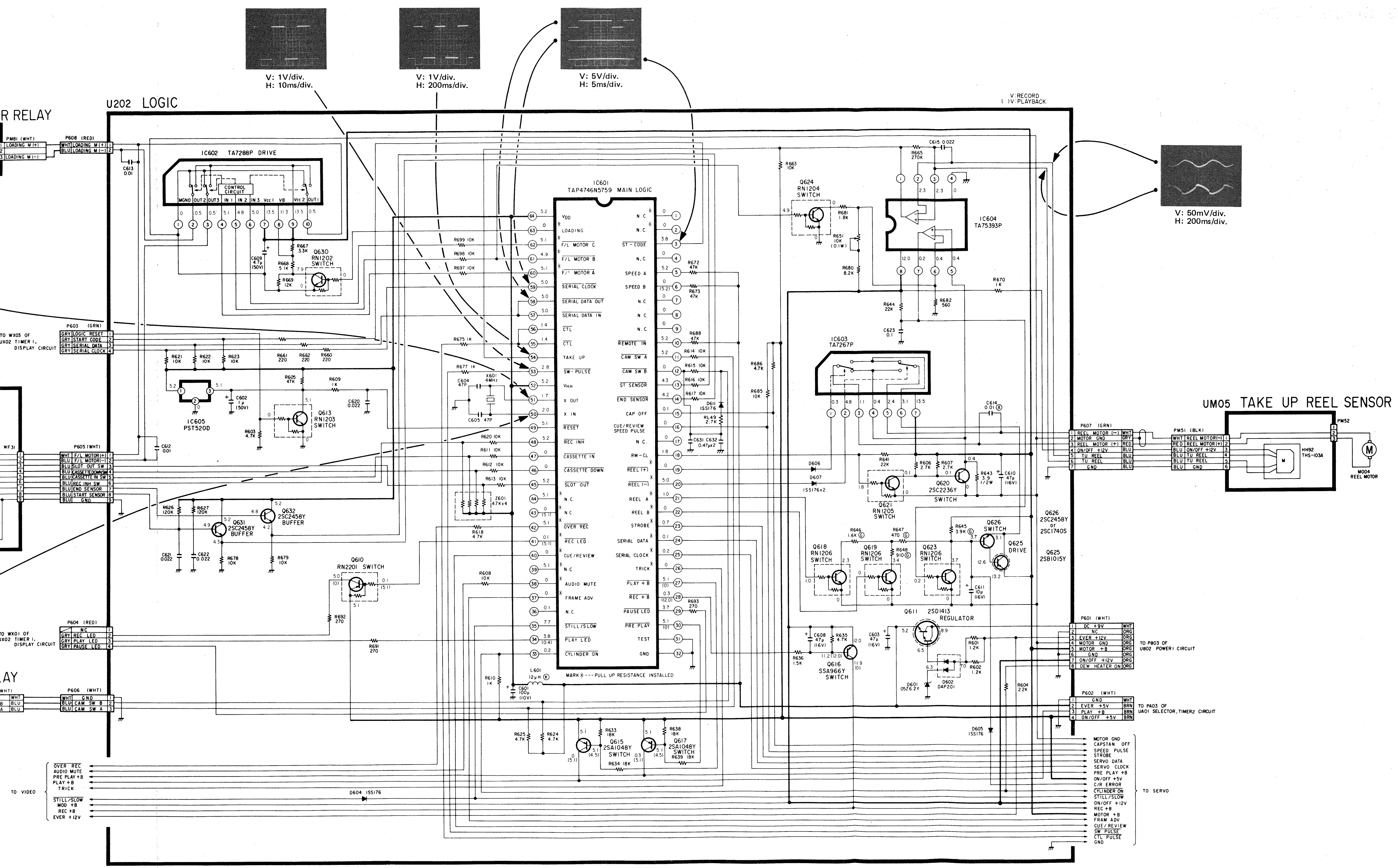
Symbol No.	Loca-tion
R651	D-7

Location of IC's

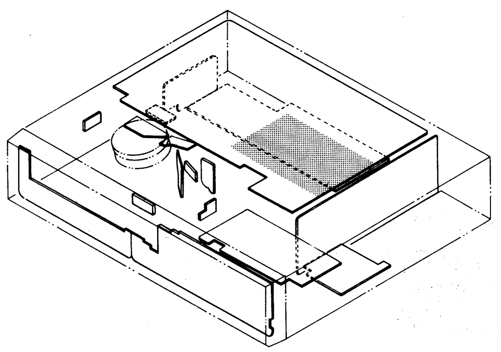
Symbol No.	Loca-tion
IC601	C-6
IC602	C-7
IC603	C-7
IC604	D-7
IC605	D-5

11-3. Logic Circuit

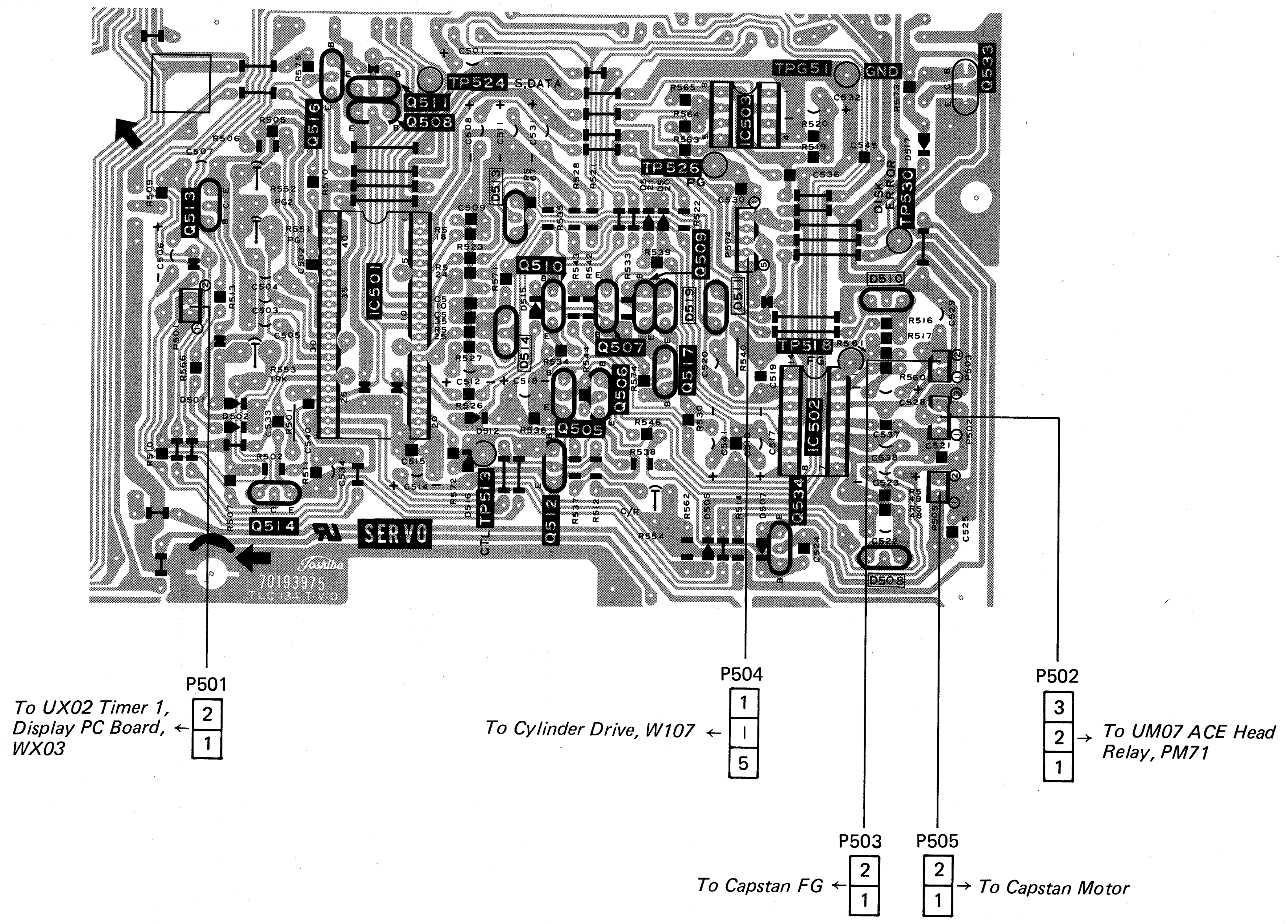

V: 1V/div.
H: 10ms/div.
V: 1V/div.
H: 200ms/div.
V: 5V/div.
H: 5ms/div.
UM08
LOADING MOTOR RELAY
B556 LOADING MOTOR
PM81 (WHT)
LOADING M (+)
LOADING M (−)
P608 (RED)
U202 LOGIC
IC602 TA7288P DRIVE
CONTROL CIRCUIT
MGND OUT2 OUT3 IN1 IN2 IN3 Vcc1 VB Vcc2 OUT1
Q630 RN1202 SWITCH
IC601 TAP4746N5759 MAIN LOGIC
VDD
LOADING
F/L MOTOR C
F/L MOTOR B
F/L MOTOR A
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
CTL
CTL
TAKE UP
SW PULSE
VHH
X OUT
X IN
RESET
REC INH
CASSETTE IN
CASSETTE DOWN
SLOT OUT
N.C.
N.C.
OVER REC
REC LED
CUE/REVIEW
N.C.
AUDIO MUTE
FRAME ADV
N.C.
STILL/SLOW
PLAY LED
CYLINDER ON
N.C.
N.C.
ST-CODE
N.C.
SPEED A
SPEED B
N.C.
N.C.
N.C.
REMOTE IN
CAM SW A
CAM SW B
ST SENSOR
END SENSOR
CAP OFF
CUE/REVIEW SPEED PULSE
N.C.
RM-CL
REEL (+)
REEL (−)
REEL A
REEL B
STROBE
SERIAL DATA
SERIAL CLOCK
TRICK
PLAY +B
REC +B
PAUSE LED
PRE PLAY
TEST
GND
MARK X --- PULL UP RESISTANCE INSTALLED
Q624 RN1204 SWITCH
IC603 TA7267P
Q621 RN1205 SWITCH
Q618 RN1206 SWITCH
Q619 RN1206 SWITCH
Q616 SSA966Y SWITCH
V: 1V/div.
H: 0.1μs/div.
TO WX03 OF UX02 TIMER I, DISPLAY CIRCUIT
P603 (GRN)
LOGIC RESET
START CODE
SERIAL DATA
SERIAL CLOCK
IC605 PST520D
Q613 RN1203 SWITCH
X601 4MHz
UM03 F/L (RIGHT)
M005 FRONT LOADING MOTOR
SLOT OUT SW
CASSETTE DOWN SW
UM02 F/L (LEFT)
CASSETTE IN SW
S993 S992
S995 REC INH SW
QM50 RN-202S-RS
TAPE END DET
C.IN SW
REC INH SW
T.END SENSOR
GND
QM51 RN-202S-RS
TAPE START DET
P605 (WHT)
F/L MOTOR(+)
F/L MOTOR(−)
SLOT OUT SW
CASSETTE DOWN SW
CASSETTE IN SW
REC INH SW
END SENSOR
START SENSOR
GND
Q631 2SC2458Y BUFFER
Q632 2SC2458Y BUFFER
Q610 RN2201 SWITCH
V: 1V/div.
H: 0.1μs/div.
TO WX01 OF UX02 TIMER I, DISPLAY CIRCUIT
P604 (RED)
NC
REC LED
PLAY LED
PAUSE LED
UM06 CAM SW RELAY
SM61
PM61 (WHT)
GND
CAM SW B
CAM SW A
P606 (WHT)
Q615 2SA1048Y SWITCH
Q617 2SA1048Y SWITCH
TO VIDEO
OVER REC
AUDIO MUTE
PRE PLAY +B
PLAY +B
TRICK
STILL/SLOW
MOD +B
REC +B
EVER +12V
D604 1SS176


V: 1V/div.
H: 10ms/div.
V: 1V/div.
H: 200ms/div.
V: 5V/div.
H: 5ms/div.
V: 50mV/div.
H: 200ms/div.
V:RECORD
( )V:PLAYBACK
U202 LOGIC
R RELAY
IC602 TA7288P DRIVE
CONTROL CIRCUIT
IC601 TAP4746N5759 MAIN LOGIC
IC604 TA75393P
IC603 TA7267P
IC605 PST520D
Q624 RN1204 SWITCH
Q630 RN1202 SWITCH
Q613 RN1203 SWITCH
Q631 2SC2458Y BUFFER
Q632 2SC2458Y BUFFER
Q610 RN2201 SWITCH
Q620 2SC2236Y SWITCH
Q621 RN1205 SWITCH
Q618 RN1206 SWITCH
Q619 RN1206 SWITCH
Q623 RN1206 SWITCH
Q626 SWITCH
Q625 DRIVE
Q626 2SC2458Y or 2SC1740S
Q625 2SB1015Y
Q611 2SD1413 REGULATOR
Q616 SSA966Y SWITCH
Q615 2SA1048Y SWITCH
Q617 2SA1048Y SWITCH
UM05 TAKE UP REEL SENSOR
HH92 THS-103A
M004 REEL MOTOR
P608 (RED)
PM81 (WHT)
LOADING M (+)
LOADING M (−)
P603 (GRN)
TO WX03 OF UX02 TIMER I, DISPLAY CIRCUIT
LOGIC RESET
START CODE
SERIAL DATA
SERIAL CLOCK
P605 (WHT)
F/L MOTOR(+)
F/L MOTOR(−)
SLOT OUT SW
CASSETTE DOWN SW
CASSETTE IN SW
REC INH SW
END SENSOR
START SENSOR
GND
P604 (RED)
TO WX01 OF UX02 TIMER I, DISPLAY CIRCUIT
NC
REC LED
PLAY LED
PAUSE LED
P606 (WHT)
CAM SW B
CAM SW A
P607 (GRN)
REEL MOTOR (−)
MOTOR GND
REEL MOTOR (+)
ON/OFF +12V
TU REEL
PM51 (BLK)
PM52
P601 (WHT)
DC +9V
EVER +12V
MOTOR GND
MOTOR +B
ON/OFF +12V
DEW HEATER ON
TO P803 OF U802 POWER1 CIRCUIT
P602 (WHT)
EVER +5V
PLAY +B
ON/OFF +5V
TO PA03 OF UA01 SELECTOR, TIMER2 CIRCUIT
VDD
LOADING
F/L MOTOR C
F/L MOTOR B
F/L MOTOR A
SERIAL CLOCK
SERIAL DATA OUT
SERIAL DATA IN
CTL
TAKE UP
SW-PULSE
VHH
X OUT
X IN
RESET
REC INH
CASSETTE IN
CASSETTE DOWN
SLOT OUT
N.C.
OVER REC
REC LED
CUE/REVIEW
AUDIO MUTE
FRAME ADV
STILL/SLOW
PLAY LED
CYLINDER ON
ST-CODE
SPEED A
SPEED B
REMOTE IN
CAM SW A
CAM SW B
ST SENSOR
END SENSOR
CAP OFF
CUE/REVIEW SPEED PULSE
RM-CL
REEL (+)
REEL (−)
REEL A
REEL B
STROBE
SERIAL DATA
SERIAL CLOCK
TRICK
PLAY +B
REC +B
PAUSE LED
PRE PLAY
TEST
GND
MARK X ---PULL UP RESISTANCE INSTALLED
X601 4MHz
Z601 4.7K×4
L601 12μH
D611 1SS176
D606
D607
1SS176×2
D605 1SS176
D604 1SS176
D601 05Z6.2Y
D602 DAP201
TO VIDEO
OVER REC
AUDIO MUTE
PRE PLAY +B
PLAY +B
TRICK
STILL/SLOW
MOD +B
REC +B
EVER +12V
TO SERVO
MOTOR GND
CAPSTAN OFF
SPEED PULSE
STROBE
SERVO DATA
SERVO CLOCK
PRE PLAY +B
ON/OFF +5V
C/R ERROR
CYLINDER ON
STILL/SLOW
ON/OFF +12V
REC +B
MOTOR +B
FRAM ADV
CUE/REVIEW
SW PULSE
CTL PULSE
GND
LAY

12-2. Servo PC Board



U202 Servo PC Board


TP524 S.DATA
Q511
Q508
Q516
Q513
IC501
Q510
Q507
Q506
Q505
Q509
Q517
Q512
TP513 CTL
Q514
SERVO
Toshiba
70193975
TLC-134-T-V-0
TPG51
GND
IC503
TP526 PG
TP530 DISK ERROR
Q533
D510
TP518 FG
IC502
Q534
D508
P501
To UX02 Timer 1, Display PC Board, WX03
2
1
P504
To Cylinder Drive, W107
1
I
5
P502
3
2
1
To UM07 ACE Head Relay, PM71
P503
To Capstan FG
2
1
P505
2
1
To Capstan Motor

Voltage and Location of Transistors

V:REC
(V):PLAY

Symbol No.	Voltage(Unit:V)			Loca- tion
	E	C	B	
Q505	0	7.41(7.41)	0.01(0.01)	D-5
Q506	0	7.41(7.41)	0.01(0.01)	D-6
Q507	7.27(7.27)	7.41(7.41)	7.22(7.20)	D-6
Q508	0	0	0.4(5.04)	C-4
Q509	6.35(6.36)	2.53(2.52)	6.74(6.72)	D-6
Q510	0	7.22(7.20)	0.06(0.05)	D-5
Q511	0	5.12(0.01)	0.04(5.05)	C-4
Q512	0	2.53(3.58)	3.14(3.15)	D-5
Q513	0	0.01(2.38)	11.97(0.51)	C-4
Q514	0	3.63(3.61)	2.06(2.06)	E-4
Q516	4.59(5.10)	0.01(5.10)	5.12(0.01)	C-4
Q517	6.4(6.4)	1.8(1.8)	6.4(6.4)	D-6
Q533	3.95(3.92)	13.54(13.56)	5.18(5.04)	C-7
Q534	6.79(6.79)	13.56(13.56)	7.39(7.39)	E-6

Location of IC's

Symbol No.	Loca- tion
IC501	D-5
IC502	D-7
IC503	C-6

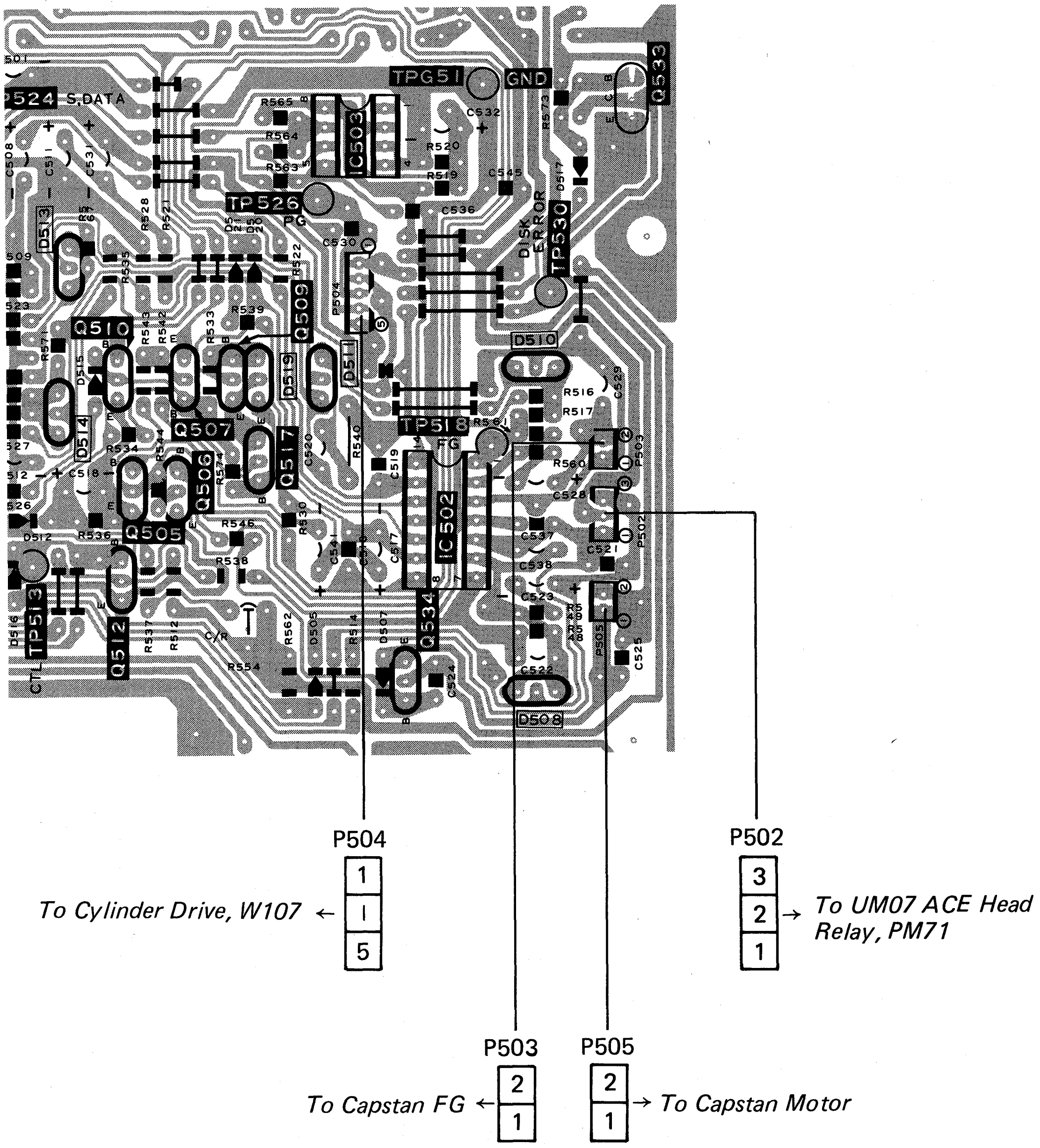
Location of VR's

Symbol No.	Loca- tion
R551	C-4
R552	C-4
R553	D-4
R554	E-6

Location of Diodes

Symbol No.	Loca- tion
D501	D-4
D502	D-4
D505	E-6
D507	E-6
D508	E-7
D510	D-7
D511	D-6
D512	D-5
D513	C-5
D514	D-5
D515	D-5
D516	D-5
D517	C-7
D519	D-6
D520	C-6
D521	C-6

202 Servo PC Board


TPG51
GND
Q533
P524
S.DATA
IC503
TP526
PG
TP530
DISK ERROR
Q510
Q509
Q507
Q506
Q505
Q514
Q512
Q513
Q517
Q511
TP516
FG
D510
IC502
Q534
D508
C/R
TP513
CTL
P504
1
I
5
To Cylinder Drive, W107 ←
P502
3
2
1
→ To UM07 ACE Head Relay, PM71
P503
2
1
To Capstan FG ←
P505
2
1
→ To Capstan Motor

Voltage and Location of Transistors

V:REC
(V):PLAY

Symbol No.	Voltage(Unit:V)			Location
	E	C	B	
Q505	0	7.41(7.41)	0.01(0.01)	D-5
Q506	0	7.41(7.41)	0.01(0.01)	D-6
Q507	7.27(7.27)	7.41(7.41)	7.22(7.20)	D-6
Q508	0	0	0.4(5.04)	C-4
Q509	6.35(6.36)	2.53(2.52)	6.74(6.72)	D-6
Q510	0	7.22(7.20)	0.06(0.05)	D-5
Q511	0	5.12(0.01)	0.04(5.05)	C-4
Q512	0	2.53(3.58)	3.14(3.15)	D-5
Q513	0	0.01(2.38)	11.97(0.51)	C-4
Q514	0	3.63(3.61)	2.06(2.06)	E-4
Q516	4.59(5.10)	0.01(5.10)	5.12(0.01)	C-4
Q517	6.4(6.4)	1.8(1.8)	6.4(6.4)	D-6
Q533	3.95(3.92)	13.54(13.56)	5.18(5.04)	C-7
Q534	6.79(6.79)	13.56(13.56)	7.39(7.39)	E-6

Location of IC's

Symbol No.	Location
IC501	D-5
IC502	D-7
IC503	C-6

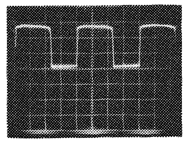
Location of VR's

Symbol No.	Location
R551	C-4
R552	C-4
R553	D-4
R554	E-6

Location of Diodes

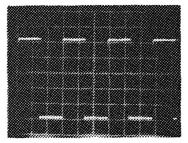
Symbol No.	Location
D501	D-4
D502	D-4
D505	E-6
D507	E-6
D508	E-7
D510	D-7
D511	D-6
D512	D-5
D513	C-5
D514	D-5
D515	D-5
D516	D-5
D517	C-7
D519	D-6
D520	C-6
D521	C-6

① IC501, Pin ⑤ C-8



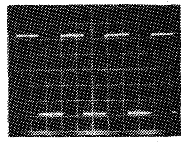
V: 0.5V/div.
H: 0.5ms/div.

② IC501, Pin ⑫ D-8



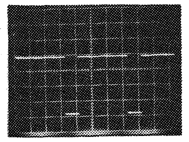
V: 1V/div.
H: 5μs/div.

③ IC501, Pin ⑮ D-8



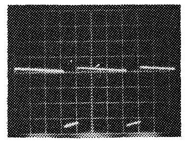
V: 1V/div.
H: 5μs/div.

④ TP513 F-7



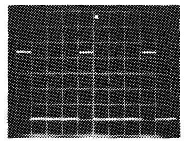
V: 1V/div.
H: 10ms/div.

⑤ IC501, Pin ⑳ E-8



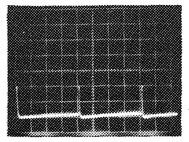
V: 1V/div.
H: 10ms/div.
(Rec)

⑥ IC501, Pin ㉒ E-6



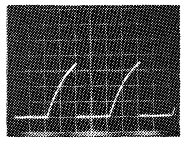
V: 1V/div.
H: 10ms/div.
(Rec)

⑦ IC501, Pin ㉕ E-6



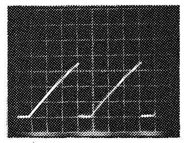
V: 0.5V/div.
H: 5ms/div.
(Rec)

⑧ IC501, Pin ㉘ D-6



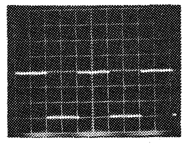
V: 1V/div.
H: 10ms/div.
(Play)

⑨ IC501, Pin ㉘ D-6



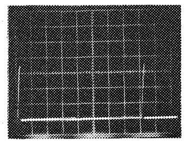
V: 1V/div.
H: 10ms/div.
(Rec)

⑩ IC501, Pin ㉜ D-6



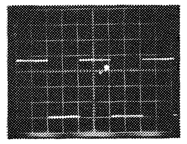
V: 1V/div.
H: 10ms/div.

⑪ IC501, Pin ㉛ D-6



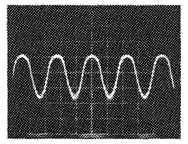
V: 1V/div.
H: 5ms/div.

⑫ IC501, Pin ㉙ D-6



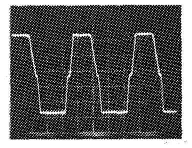
V: 1V/div.
H: 10ms/div.

⑬ IC501, Pin ㊶ B-6



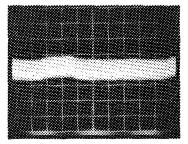
V: 0.2V/div.
H: 0.1μs/div.

⑭ IC502, Pin ① C-12



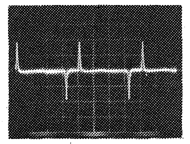
V: 2V/div.
H: 0.5ms/div.

⑮ TP530 C-13



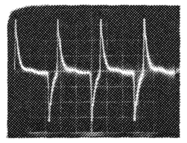
V: 0.2V/div.
H: 10ms/div.

⑯ IC502, Pin ⑦ D-12



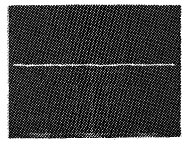
V: 0.5V/div.
H: 10ms/div.
(Play)

⑰ IC502, Pin ⑦ D-12



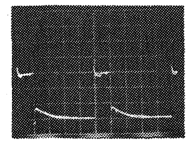
V: 0.5V/div.
H: 2ms/div.
(Cue/Review)

⑱ Q534, Emitter E-12



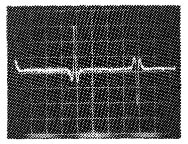
V: 2V/div.
H: 2ms/div.
(Rec/Play)

⑲ Q534, Emitter E-12



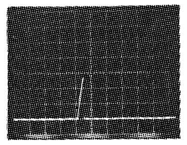
V: 2V/div.
H: 20ms/div.
(Frame Feeding)

⑳ TP526 B-12



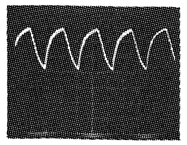
V: 0.5V/div.
H: 5ms/div.

㉑ IC501, Pin ㉗ D-6



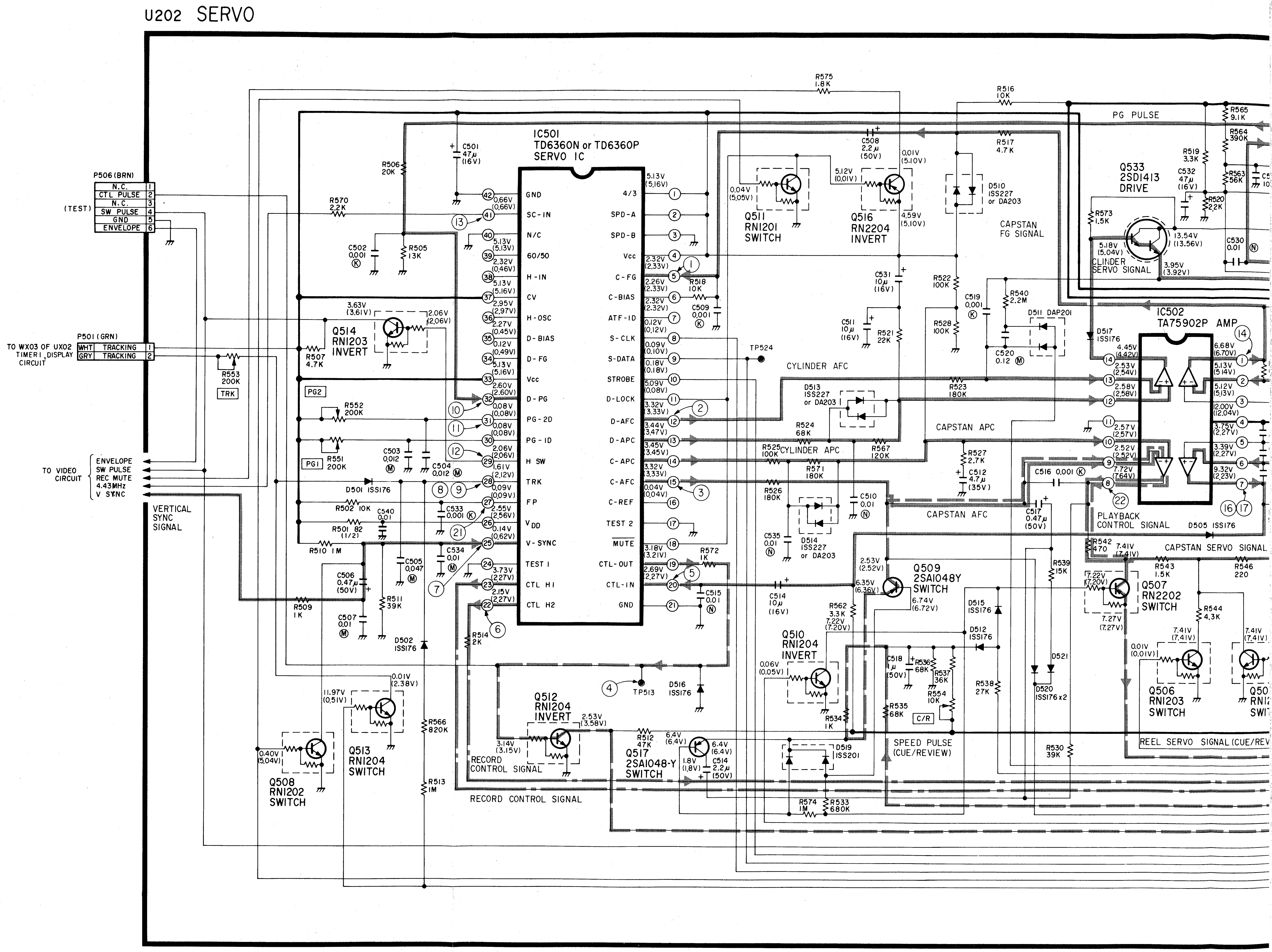
V: 1V/div.
H: 20μs/div.

㉒ IC502, Pin ⑧ D-11

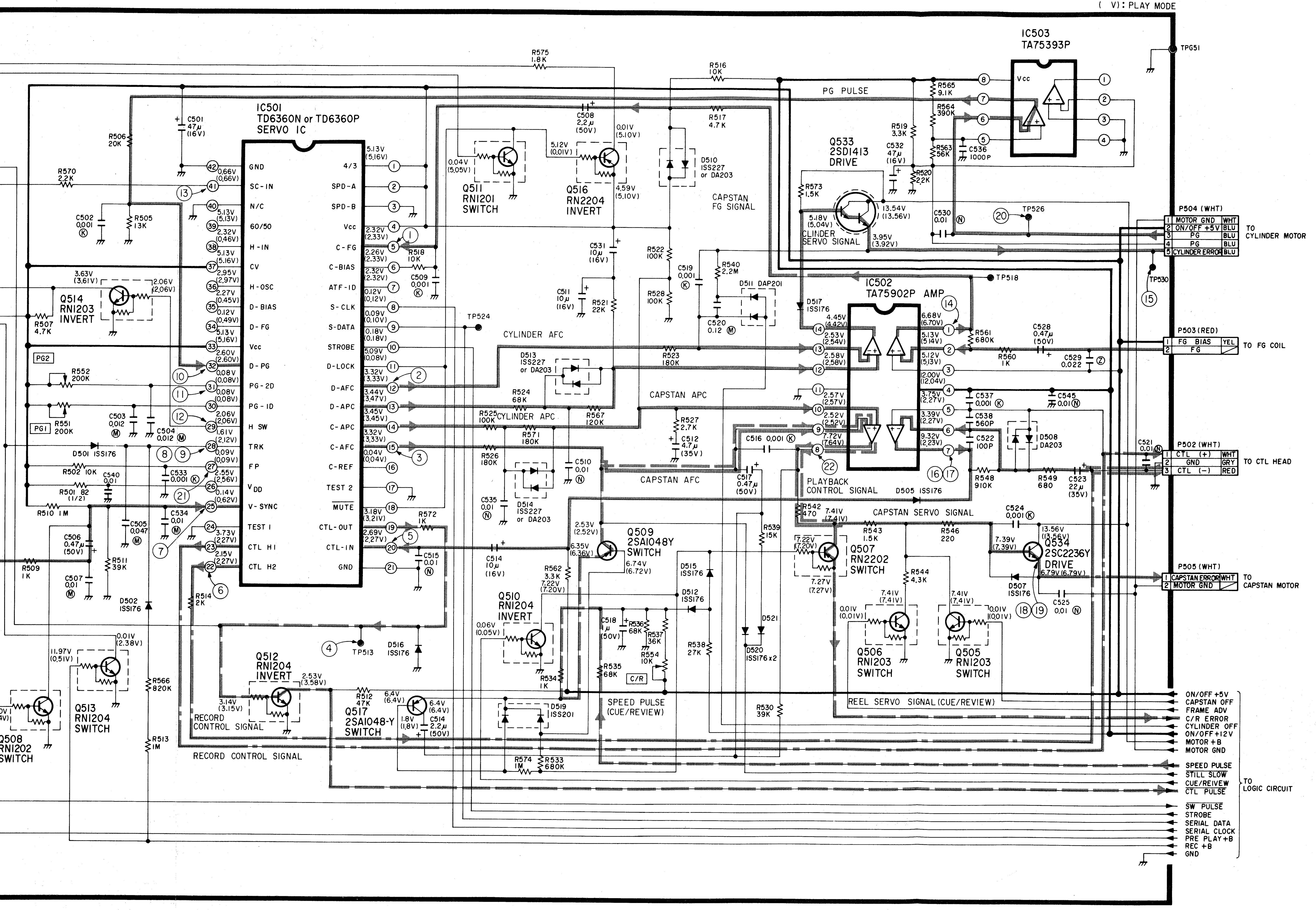


V: 1V/div.
H: 5ms/div.
(Cue/Review)

12-3. Servo Circuit


U202 SERVO
IC501
TD6360N or TD6360P
SERVO IC
GND
SC-IN
N/C
60/50
H-IN
CV
H-OSC
D-BIAS
D-FG
Vcc
D-PG
PG-2D
PG-ID
H SW
TRK
FP
VDD
V-SYNC
TEST I
CTL HI
CTL H2
4/3
SPD-A
SPD-B
Vcc
C-FG
C-BIAS
ATF-ID
S-CLK
S-DATA
STROBE
D-LOCK
D-AFC
D-APC
C-APC
C-AFC
C-REF
TEST 2
MUTE
CTL-OUT
CTL-IN
GND
P506 (BRN)
N.C.
CTL PULSE
N.C.
SW PULSE
GND
ENVELOPE
(TEST)
P501 (GRN)
TO WX03 OF UX02 TIMER1 DISPLAY CIRCUIT
WHT TRACKING
GRY TRACKING
TO VIDEO CIRCUIT
ENVELOPE
SW PULSE
REC MUTE
4.43MHz
V SYNC
VERTICAL SYNC SIGNAL
TRK
PG2
PG1
Q514 RN1203 INVERT
Q511 RN1201 SWITCH
Q516 RN2204 INVERT
Q533 2SD1413 DRIVE
Q509 2SA1048Y SWITCH
Q510 RN1204 INVERT
Q507 RN2202 SWITCH
Q506 RN1203 SWITCH
Q508 RN1202 SWITCH
Q513 RN1204 SWITCH
Q512 RN1204 INVERT
Q517 2SA1048-Y SWITCH
IC502 TA75902P AMP
PG PULSE
CAPSTAN FG SIGNAL
CYLINDER SERVO SIGNAL
CYLINDER AFC
CYLINDER APC
CAPSTAN APC
CAPSTAN AFC
PLAYBACK CONTROL SIGNAL
CAPSTAN SERVO SIGNAL
RECORD CONTROL SIGNAL
SPEED PULSE (CUE/REVIEW)
REEL SERVO SIGNAL (CUE/REV
C/R
TP524
TP513
D501 1SS176
D502 1SS176
D505 1SS176
D510 1SS227 or DA203
D511 DAP201
D512 1SS176
D513 1SS227 or DA203
D514 1SS227 or DA203
D515 1SS176
D516 1SS176
D517 1SS176
D519 1SS201
D520 1SS176x2
D521
R501 82 (1/2)
R502 10K
R505 13K
R506 20K
R507 4.7K
R509 1K
R510 1M
R511 39K
R512 47K
R513 1M
R514 2K
R516 10K
R517 4.7K
R518 10K
R519 3.3K
R520 2.2K
R521 22K
R522 100K
R523 180K
R524 68K
R525 100K
R526 180K
R527 2.7K
R528 100K
R530 39K
R533 680K
R534 1K
R535 68K
R536 68K
R537 36K
R538 27K
R539 15K
R540 2.2M
R542 470
R543 1.5K
R544 4.3K
R546 220
R551 200K
R552 200K
R553 200K
R554 10K
R562 3.3K
R563 56K
R564 390K
R565 9.1K
R566 820K
R567 120K
R570 2.2K
R571 180K
R572 1K
R573 1.5K
R574 1M
R575 1.8K
C501 47μ (16V)
C502 0.001
C503 0.012
C504 0.012
C505 0.047
C506 0.47μ (50V)
C507 0.01
C508 2.2μ (50V)
C509 0.001
C510 0.01
C511 10μ (16V)
C512 4.7μ (35V)
C514 10μ (16V)
C514 2.2μ (50V)
C515 0.01
C516 0.001
C517 0.47μ (50V)
C518 1μ (50V)
C519 0.001
C520 0.12
C530 0.01
C531 10μ (16V)
C532 47μ (16V)
C533 0.001
C534 0.01
C535 0.01
C540 0.01

V : REC MODE
(V): PLAY MODE


IC501
TD6360N or TD6360P
SERVO IC
GND
SC-IN
N/C
60/50
H-IN
CV
H-OSC
D-BIAS
D-FG
Vcc
D-PG
PG-2D
PG-ID
H SW
TRK
FP
VDD
V-SYNC
TEST I
CTL HI
CTL H2
4/3
SPD-A
SPD-B
Vcc
C-FG
C-BIAS
ATF-ID
S-CLK
S-DATA
STROBE
D-LOCK
D-AFC
D-APC
C-APC
C-AFC
C-REF
TEST 2
MUTE
CTL-OUT
CTL-IN
GND
IC502
TA75902P AMP
IC503
TA75393P
Vcc
Q511
RN1201
SWITCH
Q516
RN2204
INVERT
Q533
2SD1413
DRIVE
Q514
RN1203
INVERT
Q509
2SA1048Y
SWITCH
Q510
RN1204
INVERT
Q512
RN1204
INVERT
Q517
2SA1048-Y
SWITCH
Q513
RN1204
SWITCH
Q508
RN1202
SWITCH
Q507
RN2202
SWITCH
Q534
2SC2236Y
DRIVE
Q506
RN1203
SWITCH
Q505
RN1203
SWITCH
PG PULSE
CAPSTAN FG SIGNAL
CLINDER SERVO SIGNAL
CYLINDER AFC
CYLINDER APC
CAPSTAN APC
CAPSTAN AFC
PLAYBACK CONTROL SIGNAL
CAPSTAN SERVO SIGNAL
RECORD CONTROL SIGNAL
REEL SERVO SIGNAL (CUE/REVIEW)
SPEED PULSE (CUE/REVIEW)
C/R
PG2
PG1
TP524
TP513
TP518
TP526
TP530
TPG51
P504 (WHT)
1 MOTOR GND WHT
2 ON/OFF +5V BLU
3 PG BLU
4 PG BLU
5 CYLINDER ERROR BLU
TO CYLINDER MOTOR
P503 (RED)
1 FG BIAS YEL
2 FG
TO FG COIL
P502 (WHT)
1 CTL (+) WHT
2 GND GRY
3 CTL (−) RED
TO CTL HEAD
P505 (WHT)
1 CAPSTAN ERROR WHT
2 MOTOR GND
TO CAPSTAN MOTOR
ON/OFF +5V
CAPSTAN OFF
FRAME ADV
C/R ERROR
CYLINDER OFF
ON/OFF +12V
MOTOR +B
MOTOR GND
SPEED PULSE
STILL SLOW
CUE/REIEVW
CTL PULSE
SW PULSE
STROBE
SERIAL DATA
SERIAL CLOCK
PRE PLAY +B
REC +B
GND
TO LOGIC CIRCUIT
R575 1.8K
R516 10K
R517 4.7K
R506 20K
R570 2.2K
R505 13K
R507 4.7K
R552 200K
R551 200K
R502 10K
R501 82 (1/2)
R510 1M
R509 1K
R511 39K
R514 2K
R566 820K
R513 1M
R518 10K
R522 100K
R528 100K
R521 22K
R540 2.2M
R523 180K
R524 68K
R525 100K
R571 180K
R567 120K
R526 180K
R527 2.7K
R572 1K
R562 3.3K
R534 1K
R512 47K
R574 1M
R533 680K
R535 68K
R536 68K
R537 36K
R554 10K
R538 27K
R539 15K
R530 39K
R565 9.1K
R564 390K
R519 3.3K
R563 56K
R520 22K
R573 1.5K
R561 680K
R560 1K
R542 470
R543 1.5K
R546 220
R544 4.3K
R548 910K
R549 680
C501 47μ (16V)
C502 0.001
C503 0.012
C504 0.012
C540 0.01
C533 0.001
C534 0.01
C505 0.047
C506 0.47μ (50V)
C507 0.01
C508 2.2μ (50V)
C509 0.001
C531 10μ (16V)
C511 10μ (16V)
C519 0.001
C520 0.12
C510 0.01
C535 0.01
C512 4.7μ (35V)
C516 0.001
C517 0.47μ (50V)
C514 10μ (16V)
C515 0.01
C518 1μ (50V)
C514 2.2μ (50V)
C532 47μ (16V)
C536 1000P
C530 0.01
C528 0.47μ (50V)
C529 0.022
C537 0.001
C538 560P
C522 100P
C545 0.01
C521 0.01
C523 22μ (35V)
C524 0.001
C525 0.01
D501 1SS176
D502 1SS176
D510 1SS227 or DA203
D511 DAP201
D513 1SS227 or DA203
D514 1SS227 or DA203
D515 1SS176
D512 1SS176
D516 1SS176
D517 1SS176
D519 1SS201
D520 1SS176x2
D521
D505 1SS176
D507 1SS176
D508 DA203

1
2
3
4
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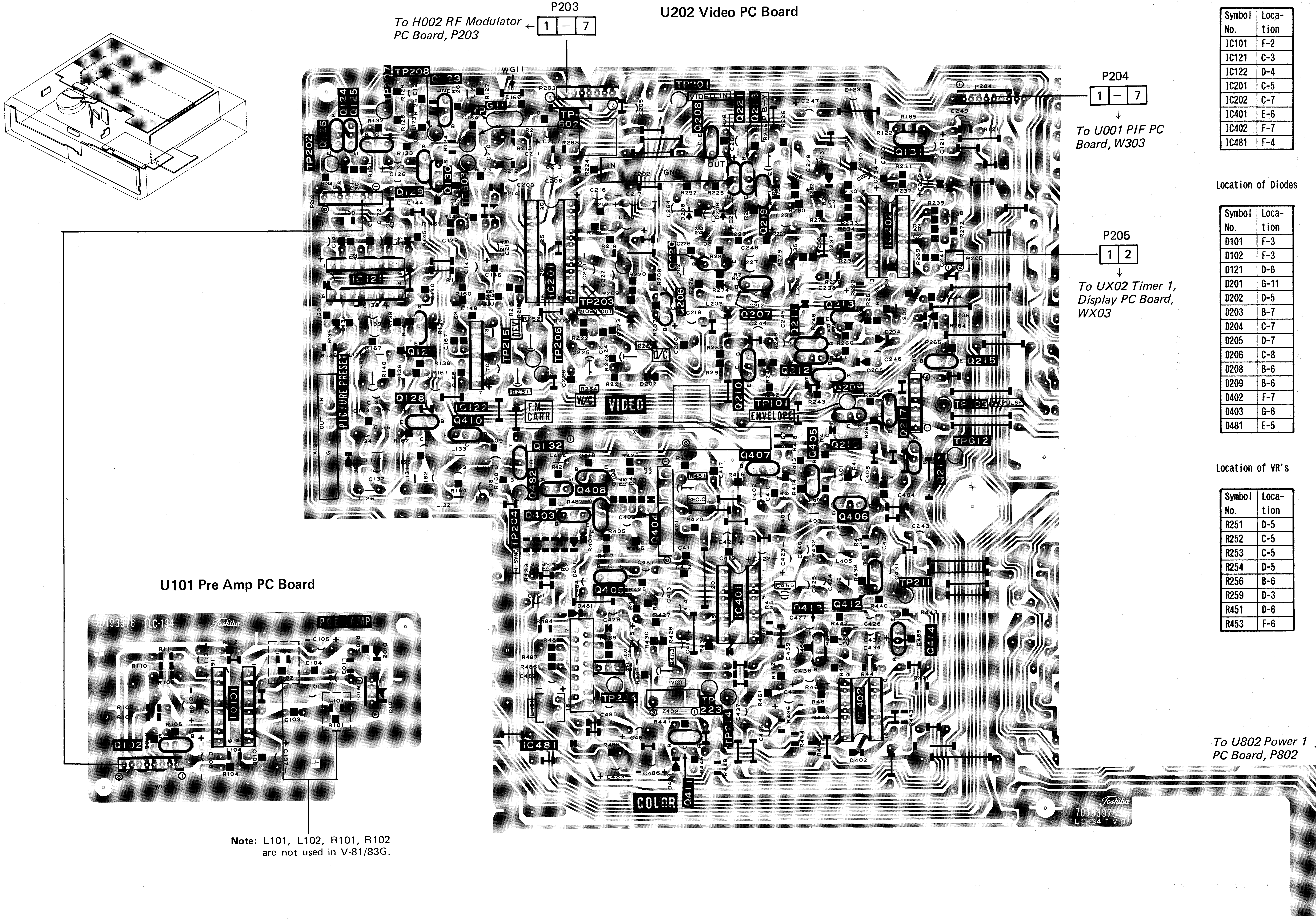
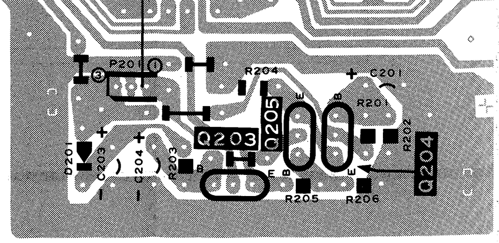
6
7
8
9
10
11
12
A
B
C
D
E
F
G

13-2. Video PC Board


P203
To H002 RF Modulator PC Board, P203
1 – 7
U202 Video PC Board
P204
1 – 7
To U001 PIF PC Board, W303
P205
1 2
To UX02 Timer 1, Display PC Board, WX03
VIDEO
ENVELOPE
COLOR
PICTURE PRESET
FM CARR
W/C
VIDEO OUT
70193975
TLC-134-T-V-0
Toshiba
U101 Pre Amp PC Board
70193976 TLC-134
Toshiba
PRE AMP
P201
To U802 Power 1 PC Board, P802
3 2 1


P201
Q203
Q205
Q204
R204
R201
R202
R205
R206
C201
C203
C204
D201

Note: L101, L102, R101, R102 are not used in V-81/83G.

Location of IC's

Symbol No.	Location
IC101	F-2
IC121	C-3
IC122	D-4
IC201	C-5
IC202	C-7
IC401	E-6
IC402	F-7
IC481	F-4

Location of Diodes

Symbol No.	Location
D101	F-3
D102	F-3
D121	D-6
D201	G-11
D202	D-5
D203	B-7
D204	C-7
D205	D-7
D206	C-8
D208	B-6
D209	B-6
D402	F-7
D403	G-6
D481	E-5

Location of VR's

Symbol No.	Location
R251	D-5
R252	C-5
R253	C-5
R254	D-5
R256	B-6
R259	D-3
R451	D-6
R453	F-6

Voltage and Location of Transistors

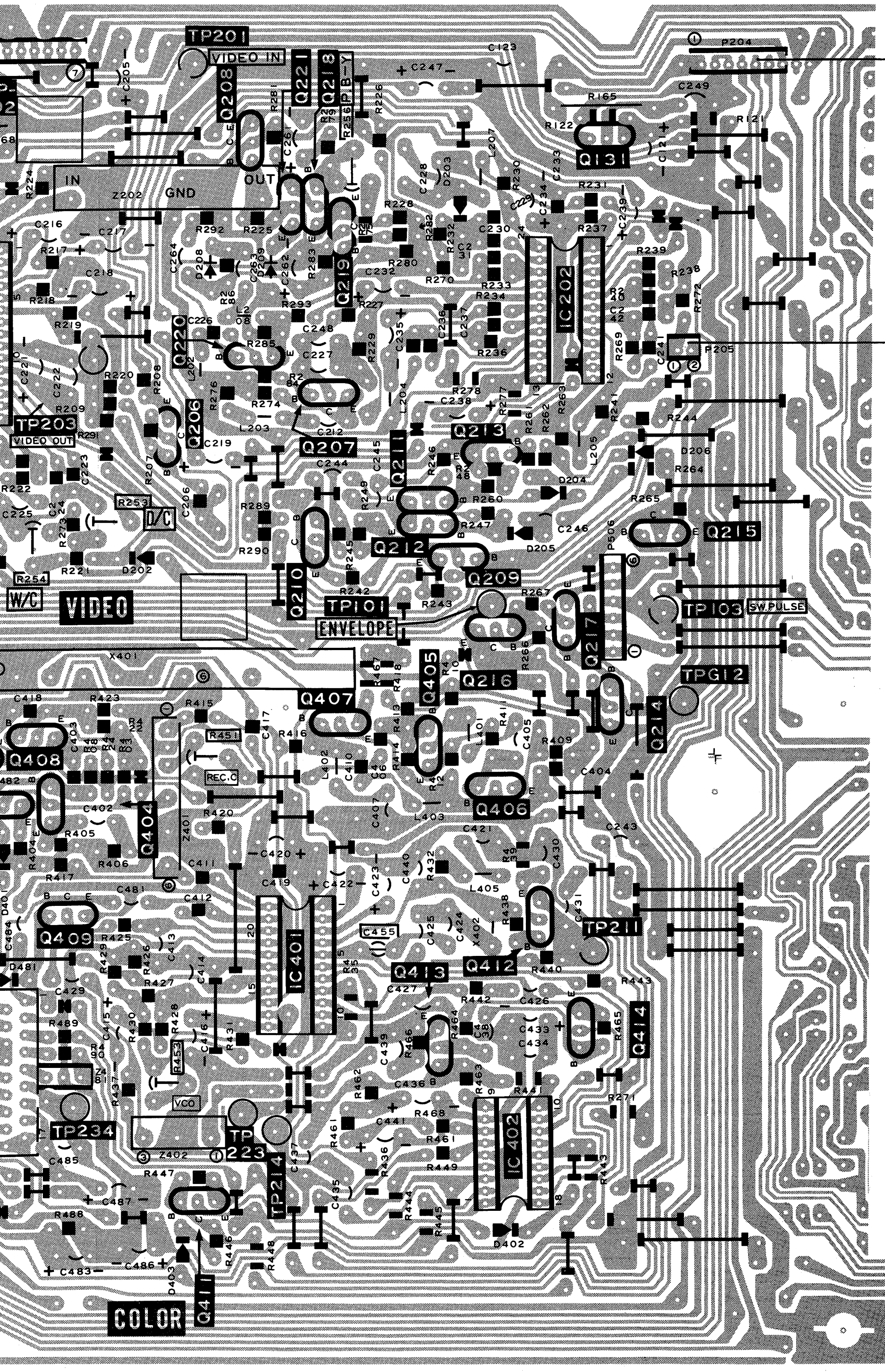
Symbol No.	Voltage(Uni	
	E	C
Q102	0(2.0)	0(4.8)
Q124	1.2(0)	4.6(0.2)
Q125	0.9(0)	4.6(0.2)
Q126	4.0(0)	7.0(0.2)
Q127	0(0.4)	0.3(2.8)
Q128	0(0.4)	5.0(0.3)
Q129	0	0
Q130	5.0	0(0)
Q131	7.0(0.3)	9.7(12.
Q203	5.0	7.4
Q204	4.3	12.0
Q205	4.3	6.3
Q206	3.0(3.0)	5.0(5.0)
Q207	2.01(2.01)	4.70(4.70)
Q208	1.51(1.48)	0
Q209	0(0)	0.3(5.0)
Q210	0	0(0)
Q211	0	0.3(0.1)
Q212	0	0.3(5.0)
Q213	5.0	0.3(5.0)
Q214	5.0(5.0)	5.0(0)
Q215	5.0	–
Q216	5.0(5.0)	0.3(5.0)
Q217	0	5.0(0)
Q218	3.80(3.80)	1.80(1.76)
Q219	3.80(3.80)	1.80(1.76)
Q220	3.83(3.83)	2.67(2.69)
Q221	2.43(2.43)	0
Q403	0.8(0)	4.3(3.1
Q404	0(0.8)	4.3(3.1
Q405	0.8(0)	4.0(0)
Q406	1.5(0)	0
Q407	2.1(1.9)	0
Q408	1.5(1.5)	5.0
Q409	0	2.5(2.5
Q410	1.5(1.5)<2.5>[2.5]	0.5(0.6)<0.3> [3.2][[3.2
Q411	0	0(0.3)
Q412	2.3	5.0
Q413	1.8(1.8)	4.8(4.8
Q414	5.0(5.0)	0(0)
Q482	–	–

5 6 7 8 9 10 11 12 13 14 15 16

03

7

U202 Video PC Board



P204

1 – 7

↓

To U001 PIF PC Board, W303

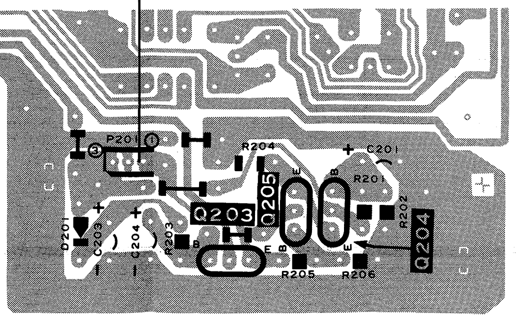
P205

1 2

↓

To UX02 Timer 1, Display PC Board, WX03

To U802 Power 1 PC Board, P802 ← P201 3 2 1



Location of IC's

Symbol No.	Location
IC101	F-2
IC121	C-3
IC122	D-4
IC201	C-5
IC202	C-7
IC401	E-6
IC402	F-7
IC481	F-4

Location of Diodes

Symbol No.	Location
D101	F-3
D102	F-3
D121	D-6
D201	G-11
D202	D-5
D203	B-7
D204	C-7
D205	D-7
D206	C-8
D208	B-6
D209	B-6
D402	F-7
D403	G-6
D481	E-5

Location of VR's

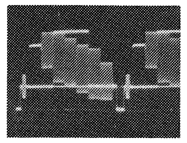
Symbol No.	Location
R251	D-5
R252	C-5
R253	C-5
R254	D-5
R256	B-6
R259	D-3
R451	D-6
R453	F-6

Voltage and Location of Transistors

V:REC
(V):PLAY

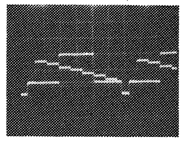
Symbol No.	Voltage(Unit:V)			Location
	E	C	B	
Q102	0(2.0)	0(4.8)	0(2.7)	F-2
Q124	1.2(0)	4.6(0.2)	1.9(0)	B-3
Q125	0.9(0)	4.6(0.2)	1.5(0)	B-3
Q126	4.0(0)	7.0(0.2)	4.6(0.2)	B-3
Q127	0(0.4)	0.3(2.8)	0(1.2)	C-4
Q128	0(0.4)	5.0(0.3)	0(2.1)	D-4
Q129	0	0	0(5.0)	B-4
Q130	5.0	0(0)	0(0)	B-4
Q131	7.0(0.3)	9.7(12.0)	9.0(0)	B-7
Q203	5.0	7.4	6.3	G-11
Q204	4.3	12.0	4.9	G-12
Q205	4.3	6.3	4.9	G-11
Q206	3.0(3.0)	5.0(5.0)	3.7(3.7)	C-6
Q207	2.01(2.01)	4.70(4.70)	2.67(2.69)	C-6
Q208	1.51(1.48)	0	0.84(0.80)	B-6
Q209	0(0)	0.3(5.0)	0(0)	D-7
Q210	0	0(0)	0.3(0.6)	D-6
Q211	0	0.3(0.1)	0.3(0.65)	C-7
Q212	0	0.3(5.0)	0.3(0.1)	D-7
Q213	5.0	0.3(5.0)	0.3(4.6)	C-7
Q214	5.0(5.0)	5.0(0)	0.4(5.0)	D-8
Q215	5.0	—	—	D-8
Q216	5.0(5.0)	0.3(5.0)	5.0(4.3)	D-7
Q217	0	5.0(0)	0.4(5.0)	D-7
Q218	3.80(3.80)	1.80(1.76)	3.15(3.15)	B-6
Q219	3.80(3.80)	1.80(1.76)	3.15(3.15)	B-6
Q220	3.83(3.83)	2.67(2.69)	3.15(3.15)	C-6
Q221	2.43(2.43)	0	1.80(1.76)	B-6
Q403	0.8(0)	4.3(3.1)	1.4(0)	E-5
Q404	0(0.8)	4.3(3.1)	0.1(1.5)	E-5
Q405	0.8(0)	4.0(0)	1.5(0)	D-7
Q406	1.5(0)	0	0.8(0)	E-7
Q407	2.1(1.9)	0	2.8(2.5)	D-6
Q408	1.5(1.5)	5.0	0(0)	D-5
Q409	0	2.5(2.5)	0(0)	E-5
Q410	1.5(1.5)<2.5>[2.5]	0.5(0.6)<0.3><<0.4>> [3.2][[3.2]]	5.0	D-4
Q411	0	0(0.3)	0.6(0.6)	F-6
Q412	2.3	5.0	3.0	E-7
Q413	1.8(1.8)	4.8(4.8)	2.4(2.4)	F-7
Q414	5.0(5.0)	0(0)	5.0(5.0)	F-7
Q482	—	—	—	E-5

① TP201 E-6



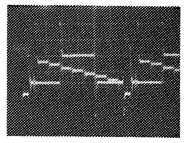
V: 0.2V/div. REC
H: 10μs/div.

② Q208, Emitter E-7



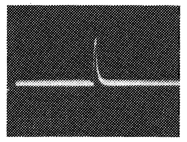
V: 0.2V/div. REC
H: 10μs/div.

③ TP206 D-10



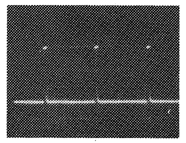
V: 0.2V/div. REC
H: 10μs/div.

④ V Sync C-9



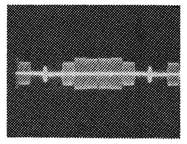
V: 0.5V/div. REC
H: 1ms/div.

⑤ TP204 F-12



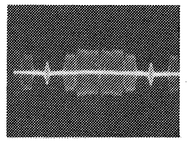
V: 1V/div. REC
H: 20μs/div.

⑥ IC401, Pin ㉒ C-12



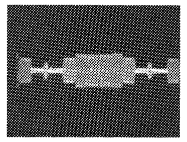
V: 0.1V/div. REC
H: 10μs/div.

⑦ IC401, Pin ㉑ C-12



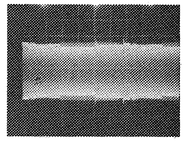
V: 0.2V/div. REC
H: 10μs/div.

⑧ IC401, Pin ⑭ C-13



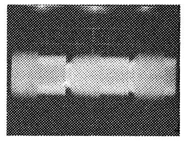
V: 0.5V/div. REC
H: 10μs/div.

⑨ TP202 C-7



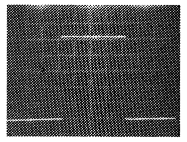
V: 0.2V/div. REC
H: 10μs/div.

⑩ TP101 B-8



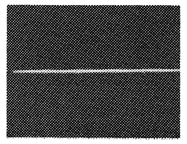
V: 0.2V/div. PLAY
H: 5ms/div.

⑪ TP103 E-15



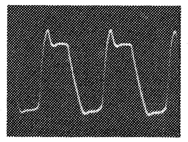
V: 1V/div. REC
H: 5ms/div.

⑫ TP223 E-14



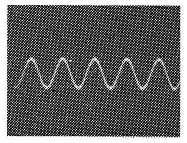
V: 0.1V/div. PLAY
H: 5ms/div.

⑬ TP214 F-14



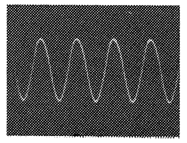
V: 0.2V/div. PLAY
H: 0.05μs/div.

⑭ IC401, Pin ⑱ C-13



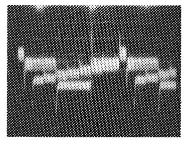
V: 0.1V/div. PLAY
H: 0.1μs/div.

⑮ TP211 E-15



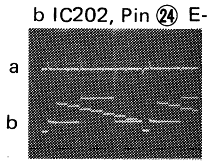
V: 0.2V/div. PLAY
H: 0.1μs/div.

⑯ Q208, Emitter E-7



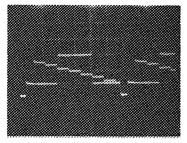
V: 50mV/div. PLAY
H: 10μs/div.

⑰ a IC202, Pin ㉓ E-8
b IC202, Pin ㉔ E-8



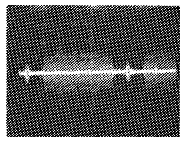
V: 0.5V/div. PLAY
H: 10μs/div.

⑱ IC201, Pin ⑥ D-9



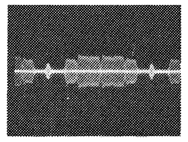
V: 0.2V/div. PLAY
H: 10μs/div.

⑲ IC401, Pin ① D-12



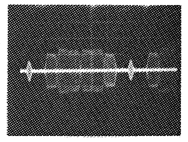
V: 0.1V/div. PLAY
H: 10μs/div.

⑳ IC401, Pin ⑭ C-13



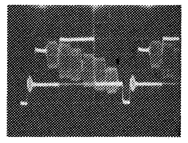
V: 0.5V/div. PLAY
H: 10μs/div.

㉑ IC201, Pin ⑧ E-9



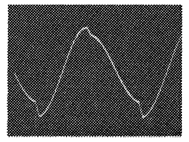
V: 0.2V/div. PLAY
H: 10μs/div.

㉒ TP203 E-6



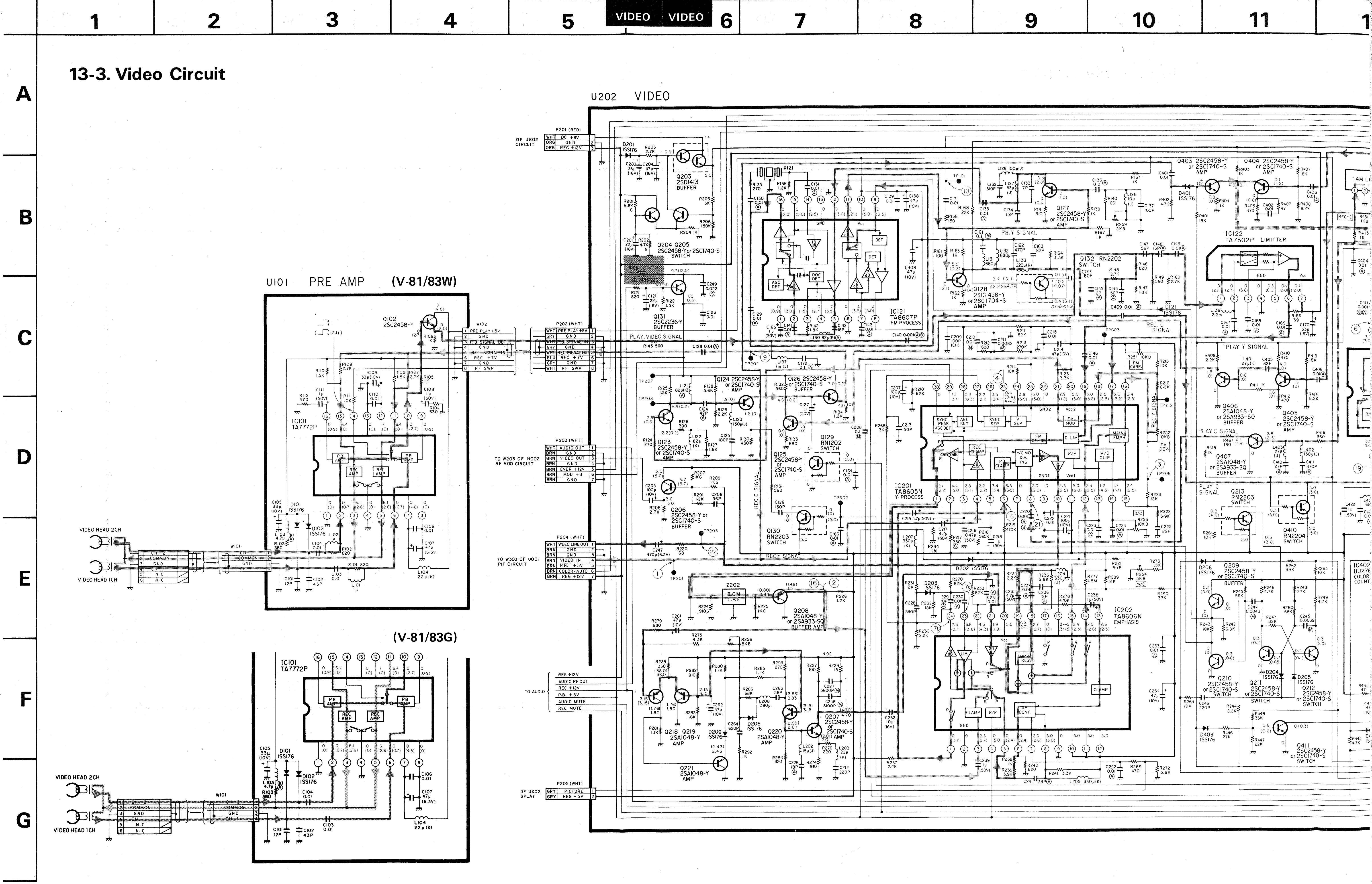
V: 0.1V/div. PLAY
H: 10μs/div.

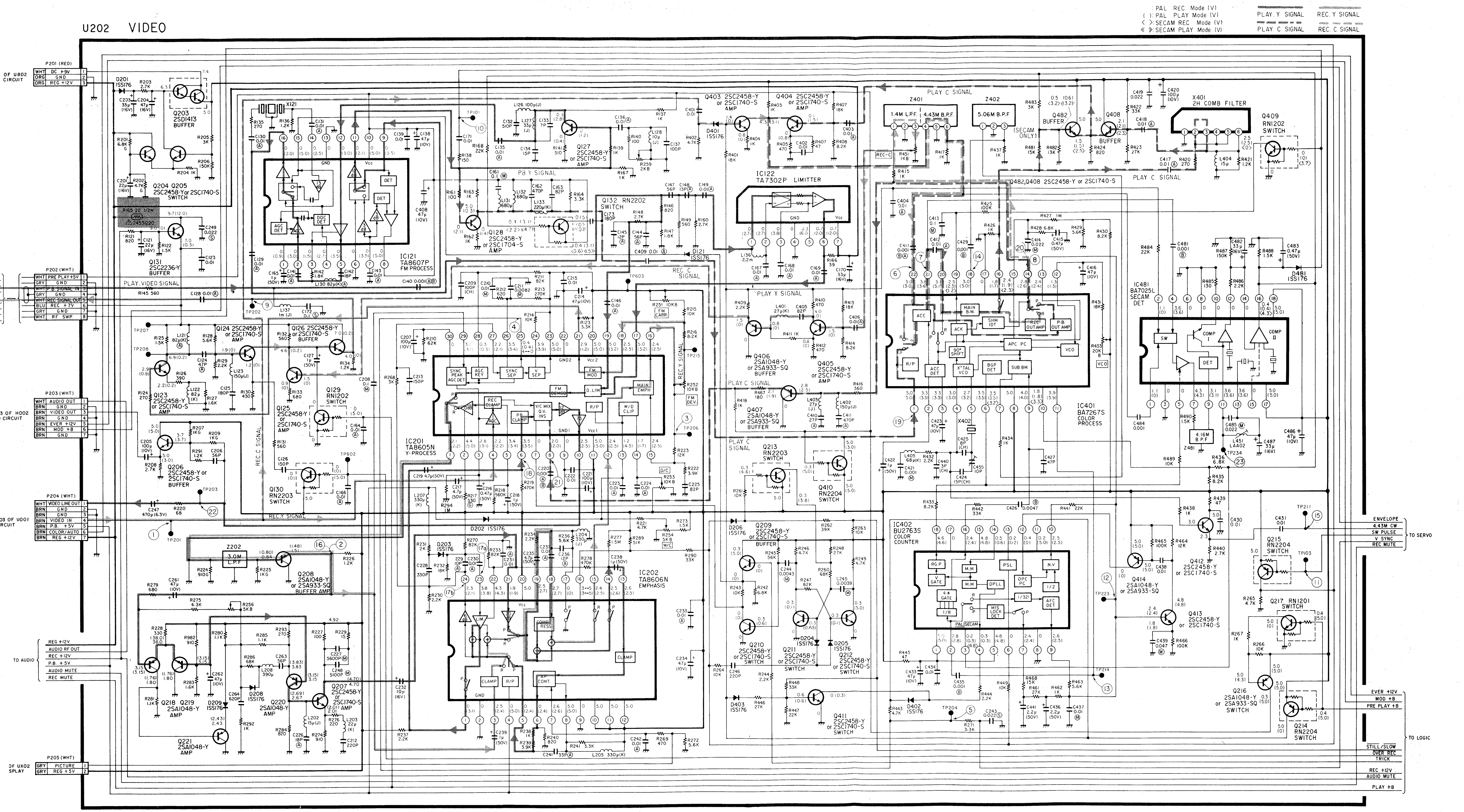
㉓ TP234 D-15



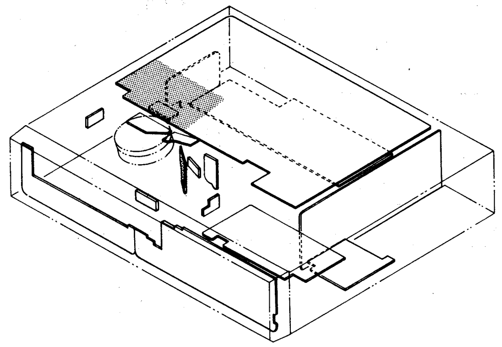
V: 0.1V/div. REC
H: 20μs/div.

13-3. Video Circuit

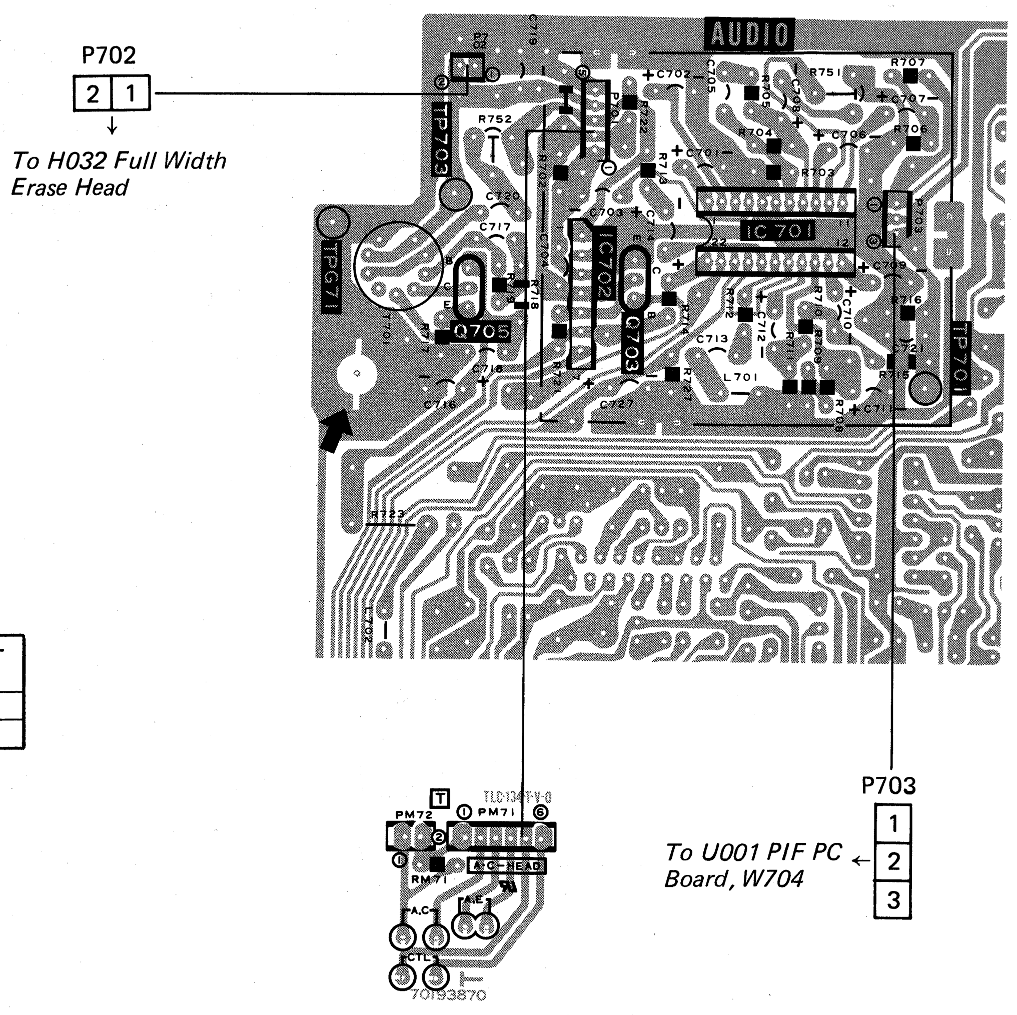

1
2
3
4
5
6
7
8
9
10
11
A
B
C
D
E
F
G
U202 VIDEO
U101 PRE AMP
(V-81/83W)
(V-81/83G)
IC101 TA7772P
Q102 2SC2458-Y
VIDEO HEAD 2CH
VIDEO HEAD 1CH
W101
W102
PB AMP
REC AMP
CH-2
COMMON
GND
CH-1
N.C
P201 (RED)
OF U802 CIRCUIT
DC +9V
REG +12V
P202 (WHT)
PRE PLAY +5V
P.B. SIGNAL OUT
REC SIGNAL IN
REC +7V
RF SWP
P203 (WHT)
TO W203 OF H002 RF MOD CIRCUIT
AUDIO OUT
VIDEO OUT
EVER +12V
MOD +B
P204 (WHT)
TO W303 OF U001 PIF CIRCUIT
VIDEO LINE OUT
VIDEO IN
P.B. +5V
COLOR/AUTO
REG +12V
TO AUDIO
REC RF OUT
REC +12V
AUDIO MUTE
REC MUTE
P205 (WHT)
OF UX02 SPLAY
PICTURE
REG +5V
Q203 2SD1413 BUFFER
Q204 Q205 2SC2458-Y or 2SC1740-S SWITCH
Q131 2SC2236-Y BUFFER
X121
IC121 TA8607P FM PROCESS
AGC DET
DOC DET
DET
PLAY VIDEO SIGNAL
Q124 2SC2458-Y or 2SC1740-S AMP
Q126 2SC2458-Y or 2SC1740-S BUFFER
Q123 2SC2458-Y or 2SC1740-S AMP
Q125 2SC2458-Y or 2SC1740-S AMP
Q129 RN1202 SWITCH
Q130 RN2203 SWITCH
Q206 2SC2458-Y or 2SC1740-S BUFFER
REC C SIGNAL
REC Y SIGNAL
Z202 3.0M L.P.F
Q208 2SA1048-Y or 2SA933-SQ BUFFER AMP
Q218 Q219 2SA1048-Y AMP
Q220 2SA1048-Y AMP
Q221 2SA1048-Y AMP
Q207 2SC2458-Y or 2SC1740-S AMP
D208 1SS176
D209 1SS176
Q127 2SC2458-Y or 2SC1740-S AMP
Q128 2SC2458-Y or 2SC1704-S AMP
PB Y SIGNAL
Q132 RN2202 SWITCH
IC201 TA8605N Y-PROCESS
SYNC PEAK AGC DET
AGC KEY
SYNC SEP
V SEP
FM MOD
FM DEMOD
D.LIM
MAIN EMPH
REC CLAMP
PB CLAMP
Y/C MIX Q.V. INS
W/D CLIP
FM DEV.
GND1
GND2
Vcc1
Vcc2
D202 1SS176
D203 1SS176
IC202 TA8606N EMPHASIS
CLAMP
R/P
AGC CONT.
COMB RESS
Q403 2SC2458-Y or 2SC1740-S AMP
Q404 2SC2458-Y or 2SC1740-S AMP
D401 1SS176
IC122 TA7302P LIMITTER
D121 1SS176
REC C SIGNAL
PLAY Y SIGNAL
PLAY C SIGNAL
Q406 2SA1048-Y or 2SA933-SQ BUFFER
Q405 2SC2458-Y or 2SC1740-S AMP
Q407 2SA1048-Y or 2SA933-SQ BUFFER
Q213 RN2203 SWITCH
Q410 RN2204 SWITCH
Q209 2SC2458-Y or 2SC1740-S BUFFER
Q210 2SC2458-Y or 2SC1740-S SWITCH
Q211 2SC2458-Y or 2SC1740-S SWITCH
Q212 2SC2458-Y or 2SC1740-S SWITCH
D204 1SS176
D205 1SS176
D206 1SS176
D403 1SS176
Q411 2SC2458-Y or 2SC1740-S SWITCH
IC402 BU27
TP101
TP201
TP202
TP203
TP206
TP207
TP208
TP215
TP602
TP603


U202 VIDEO
: PAL REC Mode (V)
( ): PAL PLAY Mode (V)
< >: SECAM REC Mode (V)
《 》: SECAM PLAY Mode (V)
PLAY Y SIGNAL
PLAY C SIGNAL
REC Y SIGNAL
REC C SIGNAL
P201 (RED)
OF U802 CIRCUIT
DC +9V
GND
REG +12V
D201 1SS176
Q203 2SD1413 BUFFER
Q204 Q205 2SC2458-Y or 2SC1740-S SWITCH
Q131 2SC2236-Y BUFFER
P202 (WHT)
PRE PLAY+5V
GND
P.B. SIGNAL IN
GND
REC SIGNAL OUT
REC +7V
GND
RF SWP
PLAY VIDEO SIGNAL
P203 (WHT)
3 OF H002 CIRCUIT
AUDIO OUT
GND
VIDEO OUT
GND
EVER +12V
MOD +8
GND
P204 (WHT)
03 OF U001 CIRCUIT
VIDEO LINE OUT
GND
GND
VIDEO IN
P.B. +5V
COLOR/AUTO
REG +12V
TO AUDIO
REG +12V
AUDIO RF OUT
REC +12V
P.B. +5V
AUDIO MUTE
REC MUTE
P205 (WHT)
OF UX02 SPLAY
PICTURE
REG +5V
X121
IC121 TA8607P FM PROCESS
AGC DET
DOC DET
DET
Q123 2SC2458-Y or 2SC1740-S AMP
Q124 2SC2458-Y or 2SC1740-S AMP
Q125 2SC2458-Y or 2SC1740-S AMP
Q126 2SC2458-Y or 2SC1740-S BUFFER
Q129 RN1202 SWITCH
Q130 RN2203 SWITCH
Q206 2SC2458-Y or 2SC1740-S BUFFER
Q127 2SC2458-Y or 2SC1740-S AMP
Q128 2SC2458-Y or 2SC1704-S AMP
Q132 RN2202 SWITCH
PB Y SIGNAL
REC C SIGNAL
REC Y SIGNAL
REC C SIGNAL
IC201 TA8605N Y-PROCESS
SYNC PEAK AGC DET
AGC KEY
SYNC SEP
V SEP
FM MOD
REC CLAMP
AGC
PB CLAMP
Y/C MIX Q.V. INS
FM DEMOD
D.LIM
MAIN EMPH
R/P
W/D CLIP
D/C
FM CARR
W/C
FM DEV
Z202 3.0M L.P.F
Q208 2SA1048-Y or 2SA933-SQ BUFFER AMP
D202 1SS176
D203 1SS176
IC202 TA8606N EMPHASIS
LIM
COMPRESS
CLAMP
R/P
AP CONT
Q218 Q219 2SA1048-Y AMP
Q220 2SA1048-Y AMP
Q221 2SA1048-Y AMP
Q207 2SC2458-Y or 2SC1740-S AMP
D208 1SS176
D209 1SS176
Q403 2SC2458-Y or 2SC1740-S AMP
Q404 2SC2458-Y or 2SC1740-S AMP
D401 1SS176
IC122 TA7302P LIMITTER
D121 1SS176
PLAY Y SIGNAL
Q406 2SA1048-Y or 2SA933-SQ BUFFER
Q405 2SC2458-Y or 2SC1740-S AMP
Q407 2SA1048-Y or 2SA933-SQ BUFFER
PLAY C SIGNAL
Q213 RN2203 SWITCH
Q410 RN2204 SWITCH
D206 1SS176
Q209 2SC2458-Y or 2SC1740-S BUFFER
Q210 2SC2458-Y or 2SC1740-S SWITCH
Q211 2SC2458-Y or 2SC1740-S SWITCH
Q212 2SC2458-Y or 2SC1740-S SWITCH
D204 1SS176
D205 1SS176
D403 1SS176
Q411 2SC2458-Y or 2SC1740-S SWITCH
Z401
1.4M LPF
4.43M B.P.F
Z402
5.06M B.P.F
(SECAM ONLY)
REC-C
Q482 BUFFER
Q408 BUFFER
Q482,Q408 2SC2458-Y or 2SC1740-S
X401 2H COMB FILTER
Q409 RN1202 SWITCH
PLAY C SIGNAL
IC401 BA7267S COLOR PROCESS
ACC
MAIN B.M.
SHM IDT
REC OUT AMP
P.B. OUT AMP
ACK
APC PC
VCO
R/P
ACC DET
90° SHIFT
X'TAL VCO
BGP DET
SUB BM
X402
IC481 BA7025L SECAM DET
SW
COMP I
COMP II
DET
Z481 4.16M B.P.F
D481 1SS176
IC402 BU2763S COLOR COUNTER
RG P
V GATE
M.M
M.M
PSL
N.V
DPLL
DPC PC
1/2
4 GATE
1/8
1/32
AFC DET
MIS LOCK DET
PAL/SECAM
D402 1SS176
Q412 2SC2458-Y or 2SC1740-S SWITCH
Q413 2SC2458-Y or 2SC1740-S SWITCH
Q414 2SA1048-Y or 2SA933-SQ
Q215 RN2204 SWITCH
Q217 RN1201 SWITCH
Q216 2SA1048-Y or 2SA933-SQ SWITCH
Q214 RN2204 SWITCH
ENVELOPE
4.43M CW
SW PULSE
V SYNC
REC MUTE
TO SERVO
EVER +12V
MOD +8
PRE PLAY +8
TO LOGIC
STILL/SLOW
OVER REC
TRICK
REC +12V
AUDIO MUTE
PLAY +8
TP201
TP202
TP203
TP206
TP207
TP208
TP211
TP214
TP215
TP223
TP234
TP103
TP101
TP204
TP602
TP603

14-2. Audio PC Board



U202 Audio PC Board


P702
2 1
To H032 Full Width Erase Head
AUDIO
TP703
TPG71
IC701
IC702
Q703
Q705
TP701
C702
C705
R751
R707
C707
R752
R706
C701
R704
C706
R703
C720
C703
C717
R718
C718
C716
C713
L701
R712
C712
R710
C709
C710
R716
C711
R715
R708
R727
C727
R723
L702
P703
1
2
3
To U001 PIF PC Board, W704
PM72
PM71
RM71
A-C HEAD
A.C
A.E
CTL
70193870

UM07 ACE Head Relay PC Board

Voltage and Location of Transistors

Symbol No.	Voltage(Unit:V)			Loca-tion
	E	C	B	
Q703	—	8.0(0)	0(4.8)	D-5
Q705	0(0)	11.1(0)	0.1(0)	D-4

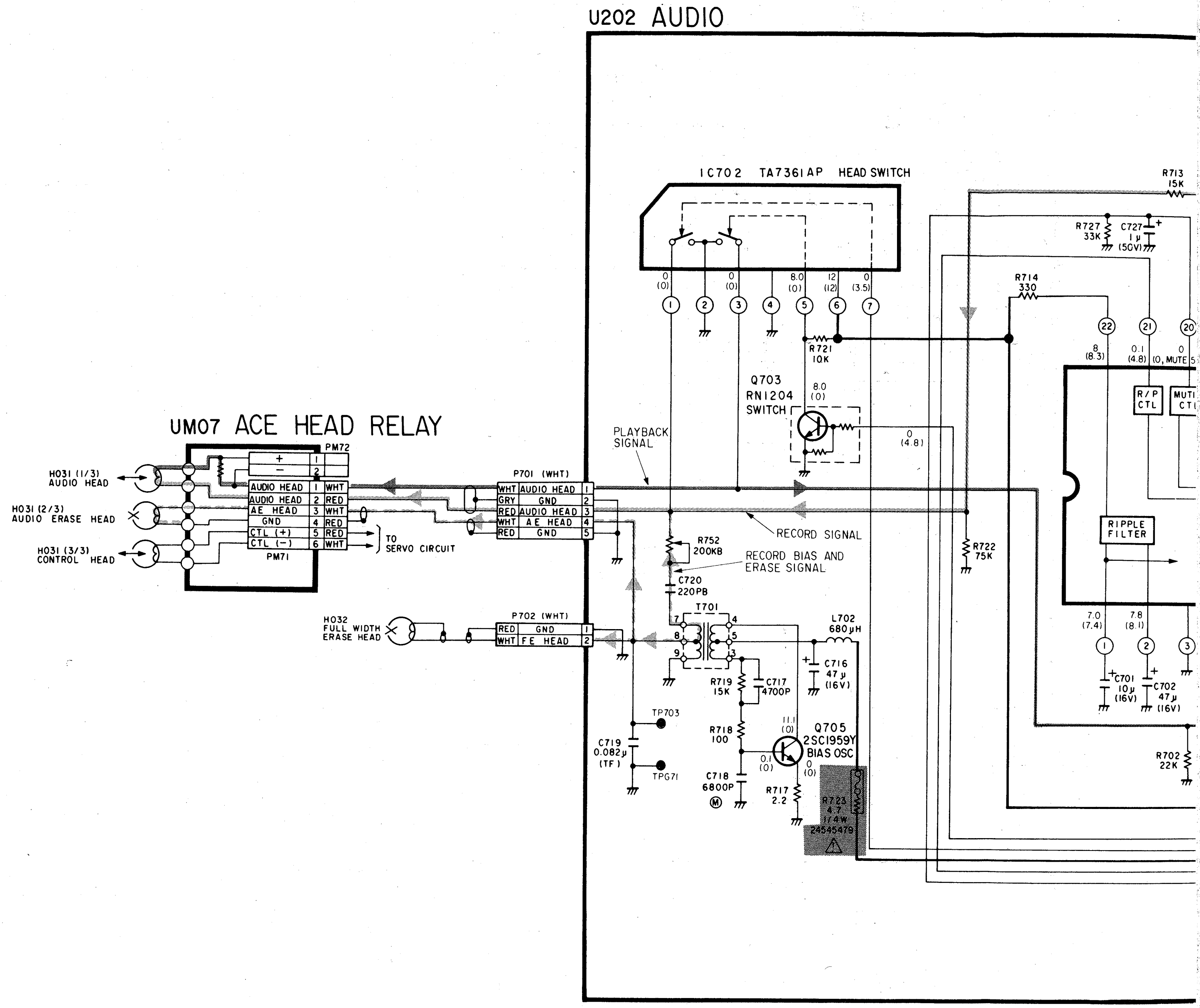
Location of VR's

Symbol No.	Loca-tion
R751	C-5
R752	C-4

Location of IC's

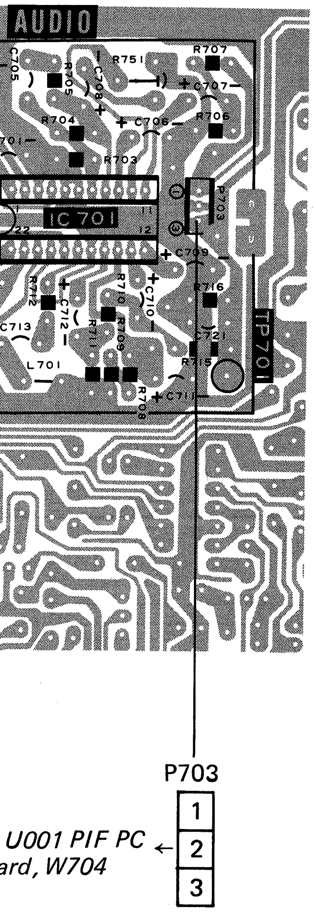
Symbol No.	Loca-tion
IC701	C-5
IC702	D-4

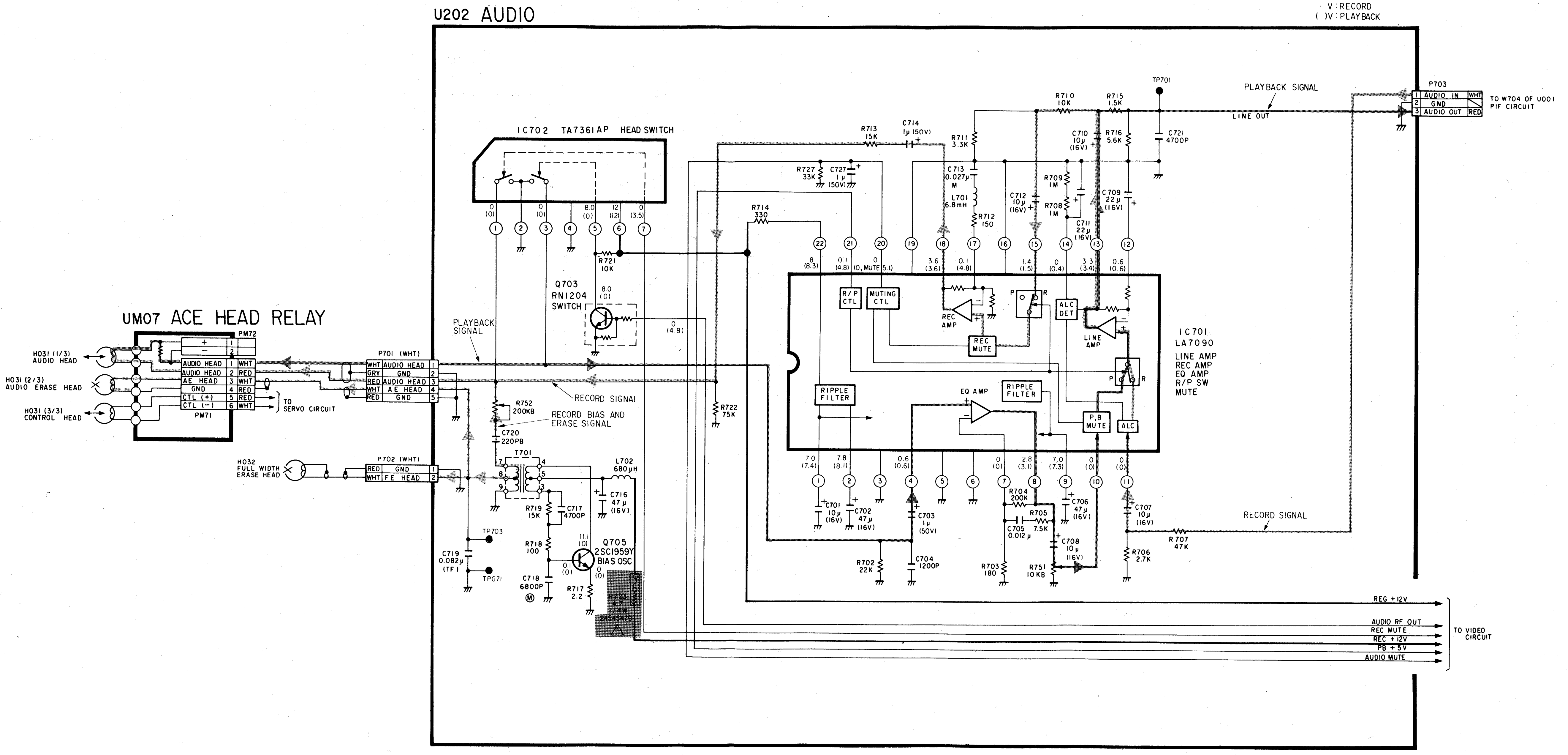
14-3. Audio Circuit


U202 AUDIO
IC702 TA7361AP HEAD SWITCH
UM07 ACE HEAD RELAY
H031 (1/3) AUDIO HEAD
H031 (2/3) AUDIO ERASE HEAD
H031 (3/3) CONTROL HEAD
PM72
PM71
AUDIO HEAD 1 WHT
AUDIO HEAD 2 RED
AE HEAD 3 WHT
GND 4 RED
CTL (+) 5 RED
CTL (−) 6 WHT
TO SERVO CIRCUIT
P701 (WHT)
WHT AUDIO HEAD 1
GRY GND 2
RED AUDIO HEAD 3
WHT AE HEAD 4
RED GND 5
H032 FULL WIDTH ERASE HEAD
P702 (WHT)
RED GND 1
WHT FE HEAD 2
PLAYBACK SIGNAL
RECORD SIGNAL
RECORD BIAS AND ERASE SIGNAL
Q703 RN1204 SWITCH
R721 10K
R752 200KB
C720 220PB
T701
R719 15K
C717 4700P
L702 680μH
C716 47μ (16V)
TP703
TPG71
C719 0.082μ (TF)
R718 100
C718 6800P
Q705 2SC1959Y BIAS OSC
R717 2.2
R723 4.7 1/4W 24545479
R722 75K
R713 15K
R727 33K
C727 1μ (50V)
R714 330
RIPPLE FILTER
R/P CTL
MUTE
C701 10μ (16V)
C702 47μ (16V)
R702 22K

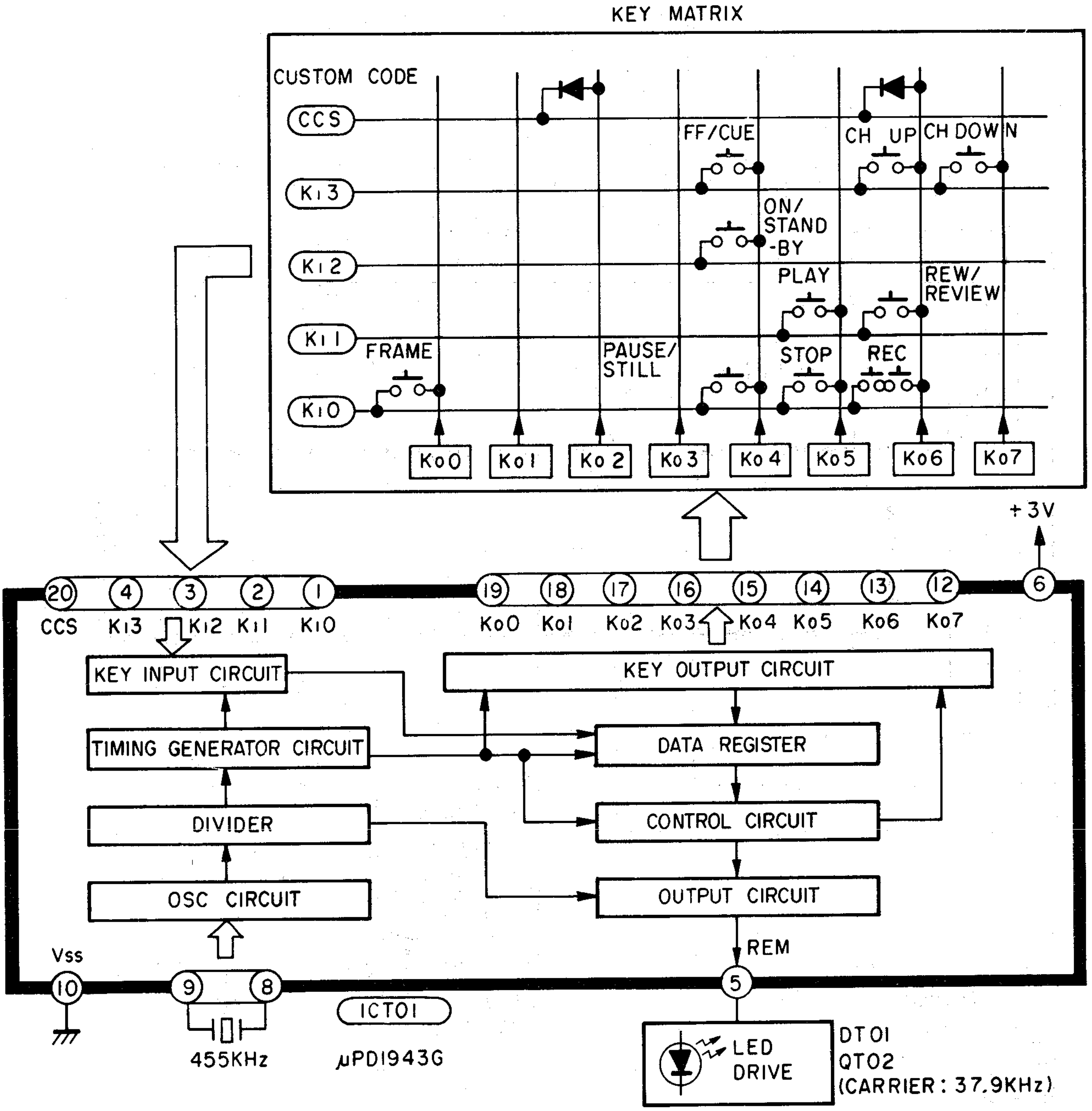
14-3. Audio Circuit

C Board

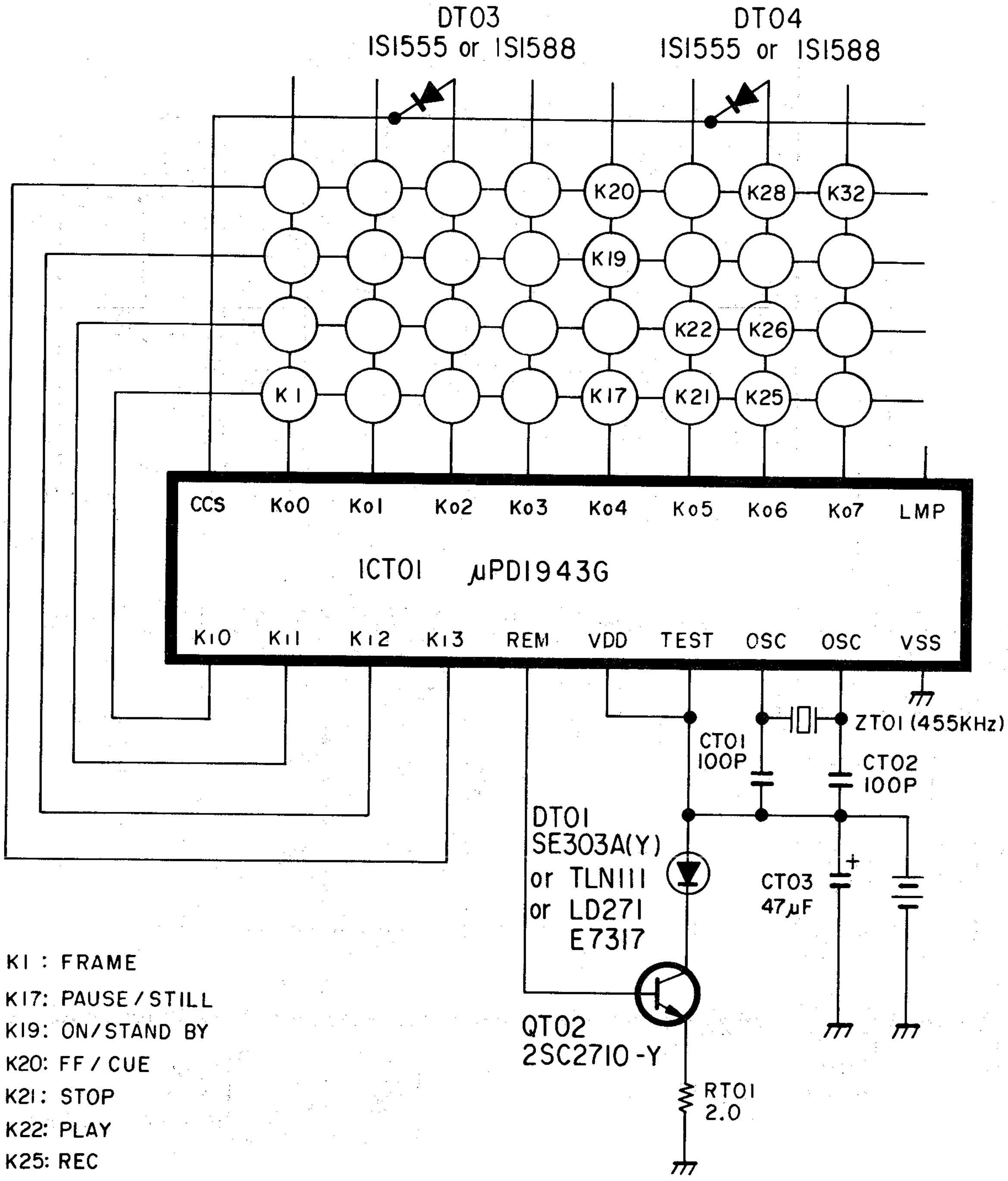

AUDIO
C705
R751
R707
C707
R705
C708
R704
R706
R703
IC701
P703
C709
R716
C710
C712
R711
R709
C713
L701
R715
C721
C711
R708
TP701
P703
1
2
3
U001 PIF PC
ard, W704


U202 AUDIO
V : RECORD
( )V : PLAYBACK
UM07 ACE HEAD RELAY
PM72
PM71
H031 (1/3) AUDIO HEAD
H031 (2/3) AUDIO ERASE HEAD
H031 (3/3) CONTROL HEAD
AUDIO HEAD 1 WHT
AUDIO HEAD 2 RED
AE HEAD 3 WHT
GND 4 RED
CTL (+) 5 RED
CTL (−) 6 WHT
TO SERVO CIRCUIT
P701 (WHT)
WHT AUDIO HEAD 1
GRY GND 2
RED AUDIO HEAD 3
WHT AE HEAD 4
RED GND 5
H032 FULL WIDTH ERASE HEAD
P702 (WHT)
RED GND 1
WHT FE HEAD 2
IC702 TA7361AP HEAD SWITCH
Q703 RN1204 SWITCH
R721 10K
PLAYBACK SIGNAL
RECORD SIGNAL
RECORD BIAS AND ERASE SIGNAL
R752 200KB
C720 220PB
T701
R722 75K
L702 680μH
C716 47μ (16V)
R719 15K
C717 4700P
TP703
TPG71
C719 0.082μ (TF)
R718 100
Q705 2SC1959Y BIAS OSC
C718 6800P
R717 2.2
R723 4.7 1/4W 24545479
R714 330
R727 33K
C727 1μ (50V)
R713 15K
C714 1μ (50V)
R711 3.3K
C713 0.027μ M
L701 6.8mH
R712 150
C712 10μ (16V)
R709 1M
R708 1M
C711 22μ (16V)
R710 10K
C710 10μ (16V)
R715 1.5K
R716 5.6K
C709 22μ (16V)
TP701
C721 4700P
PLAYBACK SIGNAL
LINE OUT
P703
1 AUDIO IN WHT
2 GND
3 AUDIO OUT RED
TO W704 OF U001 PIF CIRCUIT
IC701 LA7090
LINE AMP
REC AMP
EQ AMP
R/P SW
MUTE
R/P CTL
MUTING CTL
REC AMP
REC MUTE
ALC DET
LINE AMP
RIPPLE FILTER
EQ AMP
RIPPLE FILTER
P.B MUTE
ALC
C701 10μ (16V)
C702 47μ (16V)
C703 1μ (50V)
C704 1200P
R702 22K
R704 200K
R705 7.5K
C705 0.012μ
R703 180
R751 10KB
C706 47μ (16V)
C708 10μ (16V)
C707 10μ (16V)
R707 47K
R706 2.7K
RECORD SIGNAL
REG +12V
AUDIO RF OUT
REC MUTE
REC +12V
PB +5V
AUDIO MUTE
TO VIDEO CIRCUIT

15-1. Remote Control Block Diagram


KEY MATRIX
CUSTOM CODE
CCS
Ki3
Ki2
Ki1
Ki0
FF/CUE
CH UP
CH DOWN
ON/STAND-BY
PLAY
REW/REVIEW
FRAME
PAUSE/STILL
STOP
REC
Ko0
Ko1
Ko2
Ko3
Ko4
Ko5
Ko6
Ko7
+3V
20
4
3
2
1
19
18
17
16
15
14
13
12
6
CCS
Ki3
Ki2
Ki1
Ki0
Ko0
Ko1
Ko2
Ko3
Ko4
Ko5
Ko6
Ko7
KEY INPUT CIRCUIT
TIMING GENERATOR CIRCUIT
DIVIDER
OSC CIRCUIT
KEY OUTPUT CIRCUIT
DATA REGISTER
CONTROL CIRCUIT
OUTPUT CIRCUIT
REM
Vss
10
9
8
5
455KHz
ICT01
μPD1943G
LED DRIVE
DT01
QT02
(CARRIER: 37.9KHz)

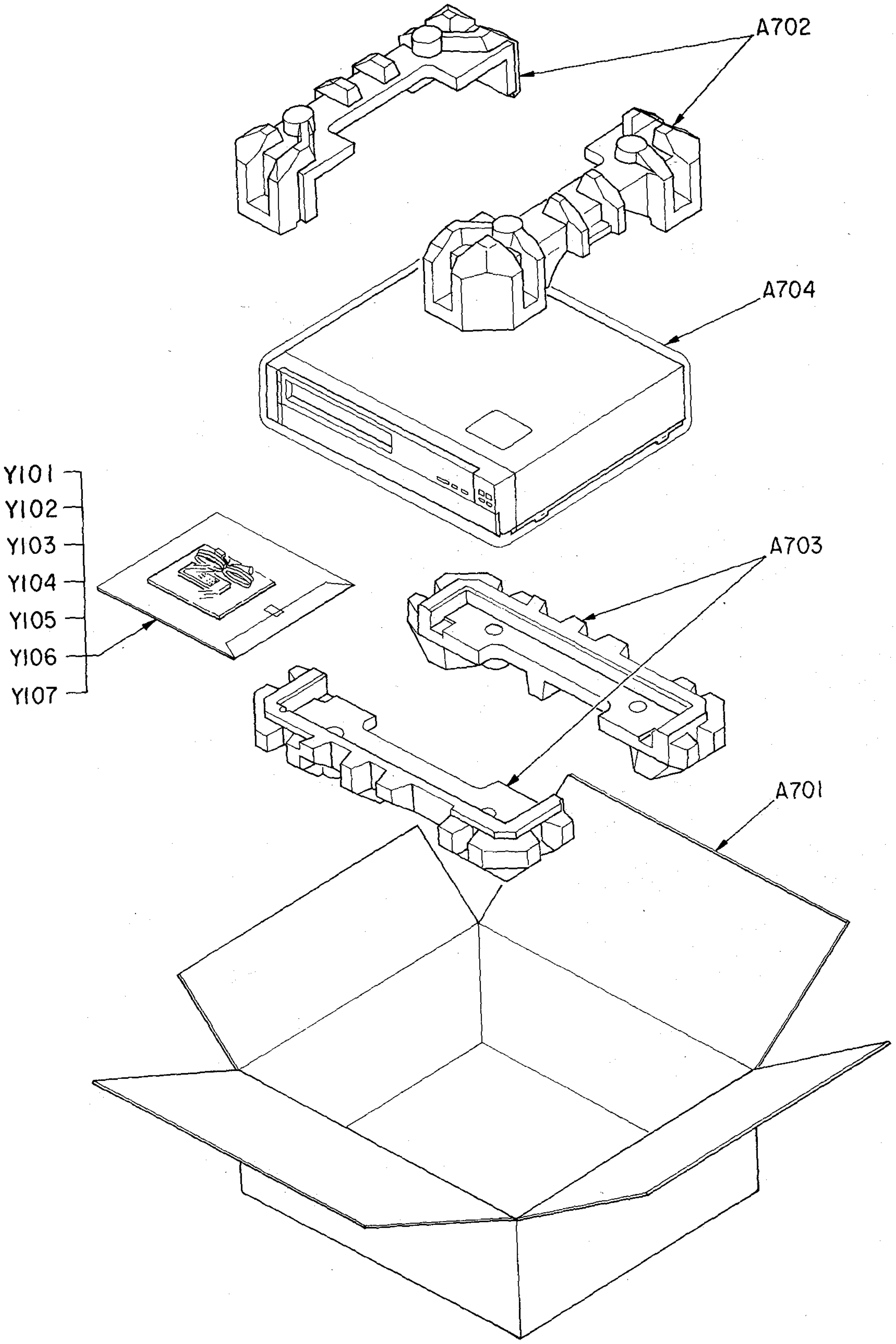
15-2. Remote Control Circuit


DT03
1S1555 or 1S1588
DT04
1S1555 or 1S1588
K20
K28
K32
K19
K22
K26
K1
K17
K21
K25
CCS
Ko0
Ko1
Ko2
Ko3
Ko4
Ko5
Ko6
Ko7
LMP
ICT01 μPD1943G
Ki0
Ki1
Ki2
Ki3
REM
VDD
TEST
OSC
OSC
VSS
ZT01 (455KHz)
CT01
100P
CT02
100P
DT01
SE303A(Y)
or TLN111
or LD271
E7317
CT03
47μF
QT02
2SC2710-Y
RT01
2.0

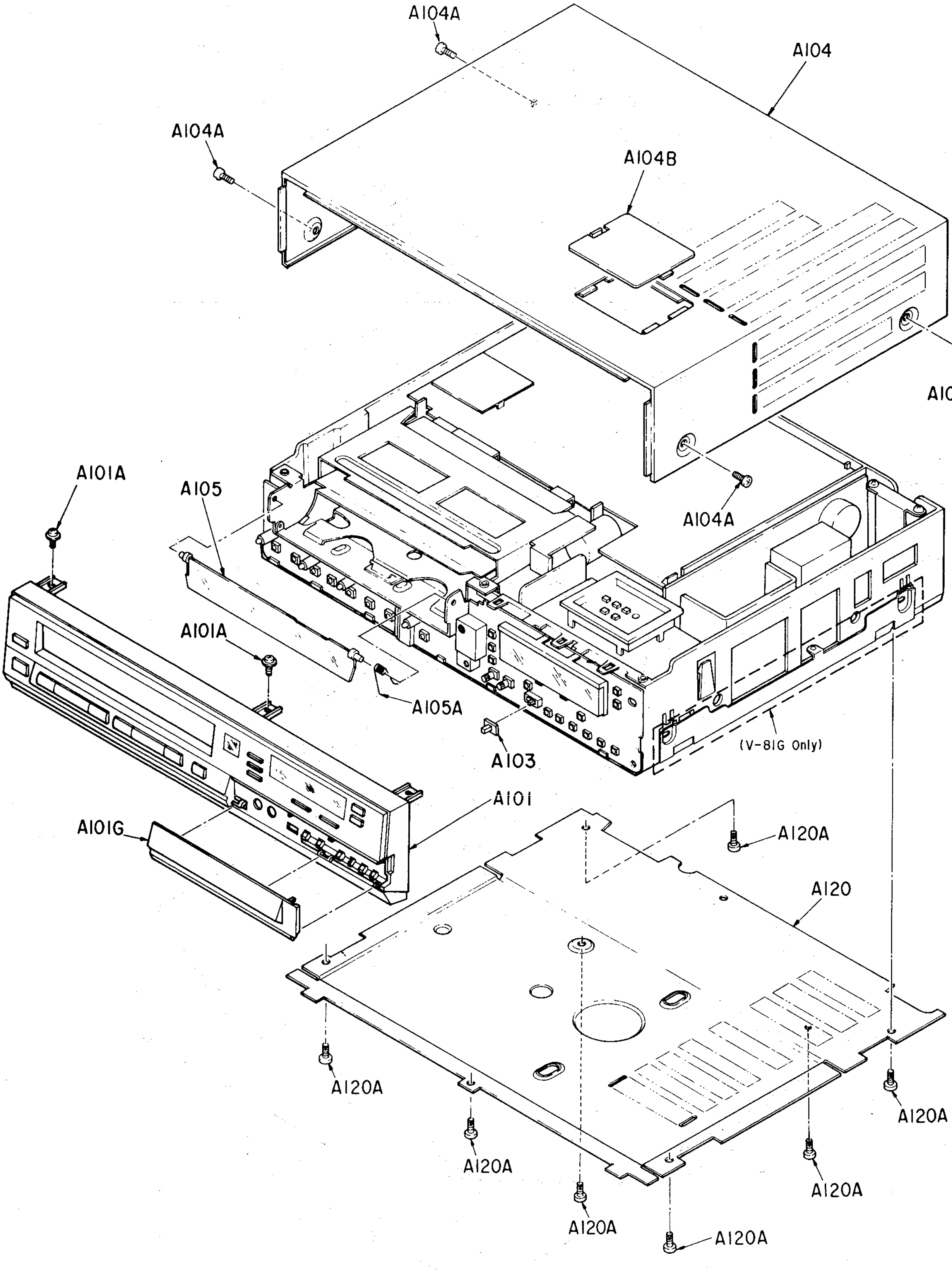
K1 : FRAME
K17: PAUSE/STILL
K19: ON/STAND BY
K20: FF/CUE
K21: STOP
K22: PLAY
K25: REC
K26: REW/REVIEW
K28: CH UP
K32: CH DOWN

1.Exploded Views

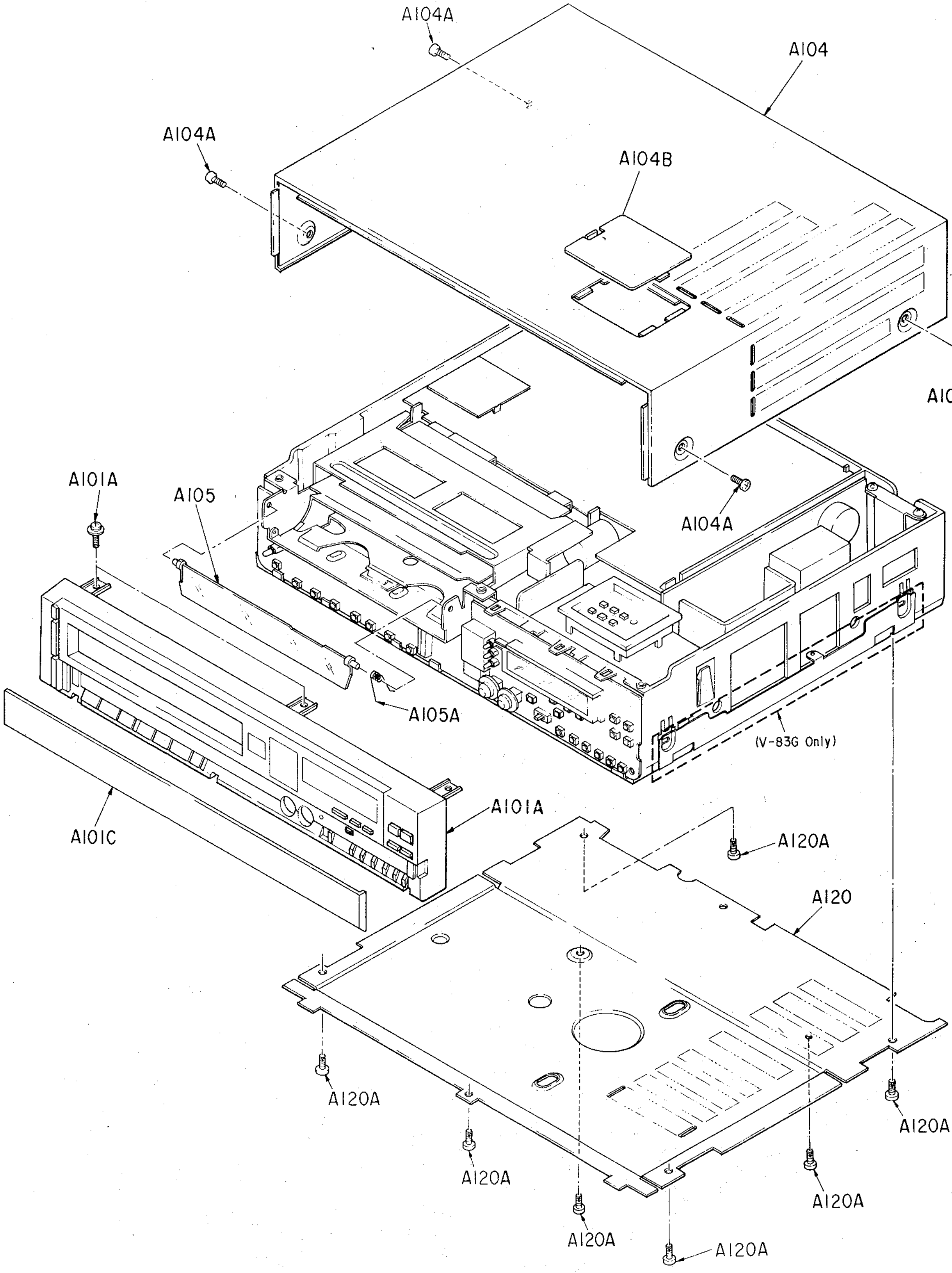
(1) Packing Assembly


A702
A704
Y101
Y102
Y103
Y104
Y105
Y106
Y107
A703
A701

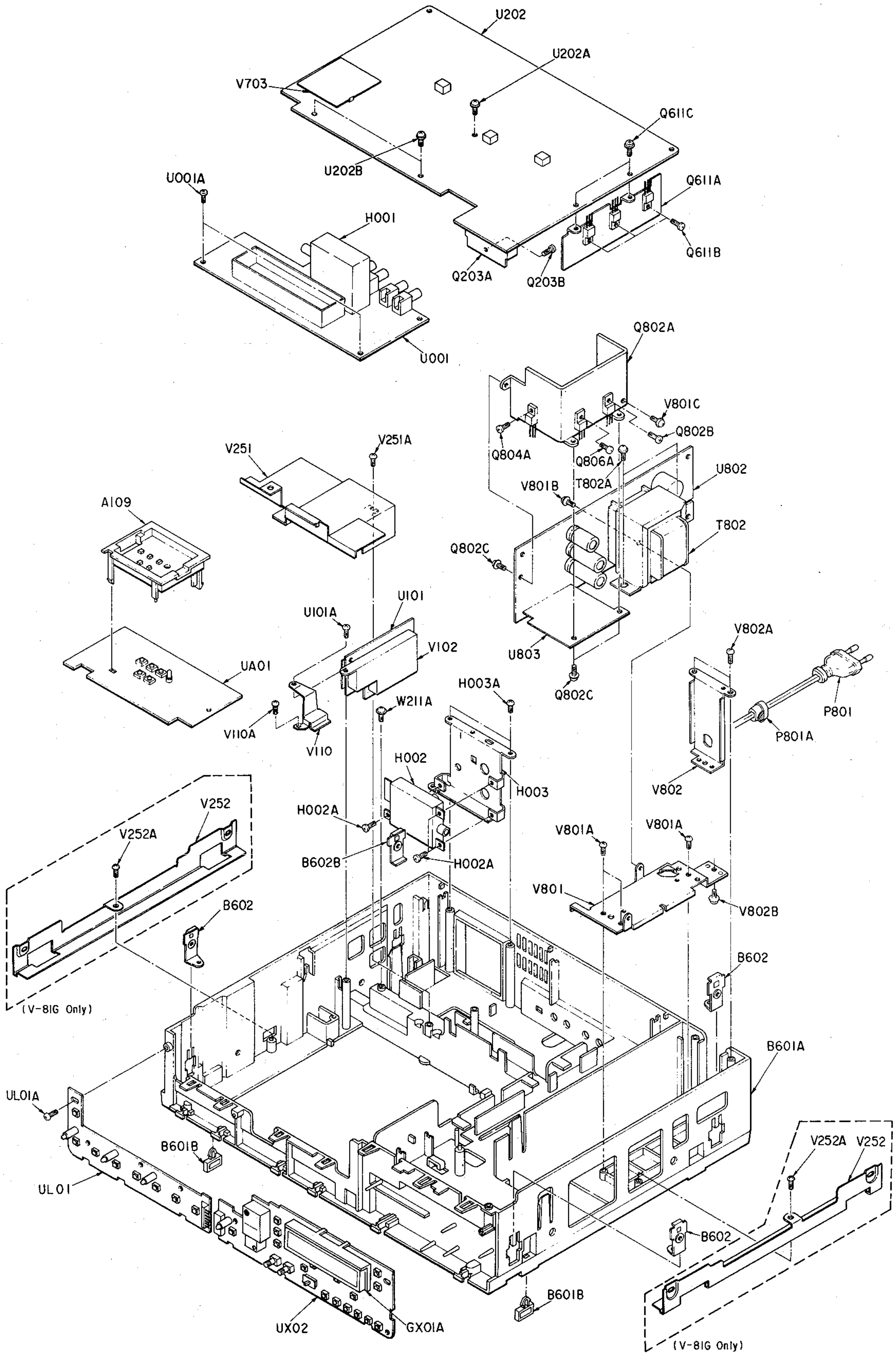
(2) Cabinet Assembly (V-81G/W)


A104A
A104
A104A
A104B
A104A
A104A
A101A
A105
A101A
A105A
A103
(V-81G Only)
A101
A101G
A120A
A120
A120A
A120A
A120A
A120A
A120A
A120A

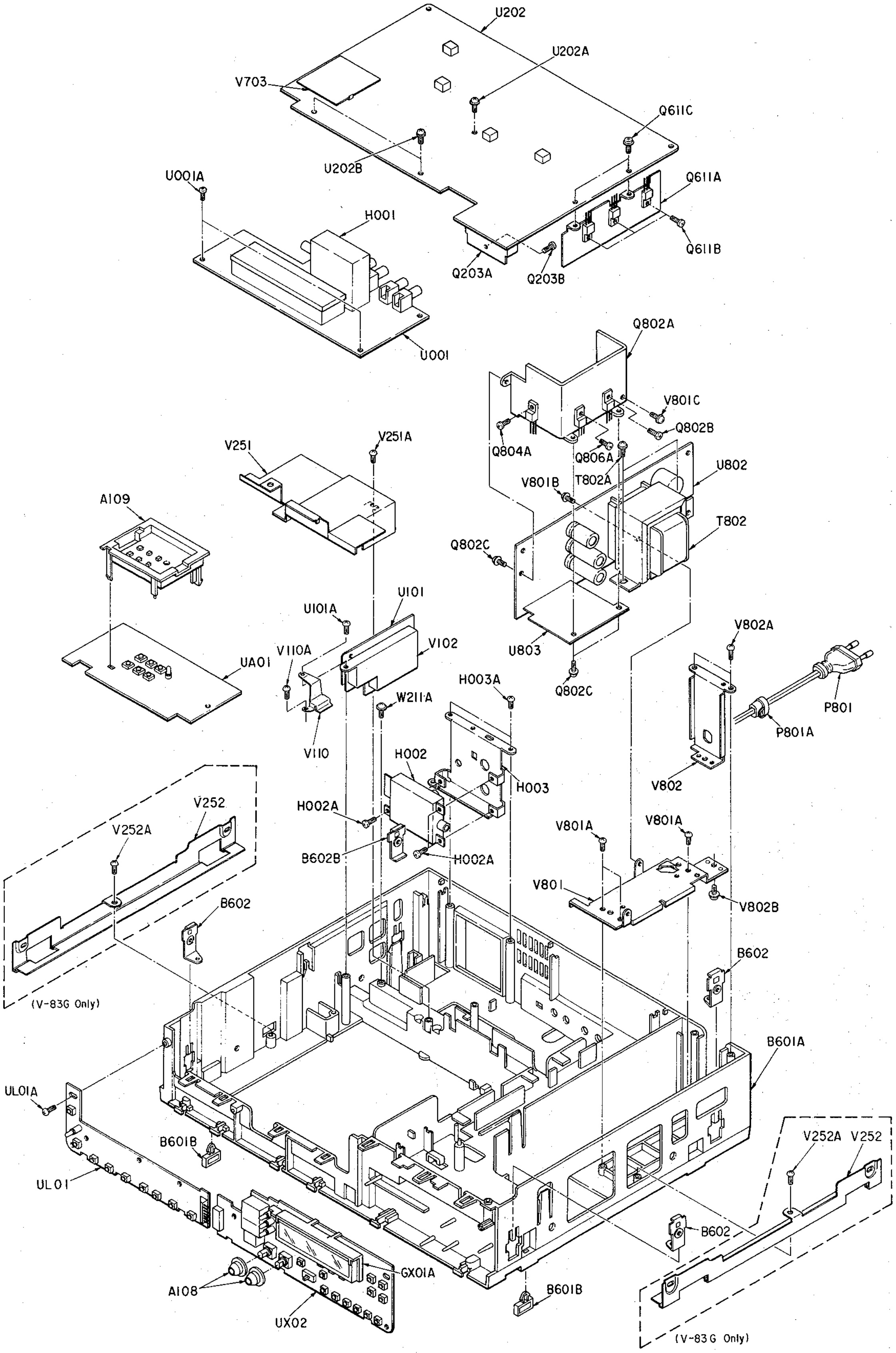
Cabinet Assembly (V-83G/W)


A104A
A104
A104A
A104B
A104A
A101A
A105
A104A
A105A
(V-83G Only)
A101A
A101C
A120A
A120
A120A
A120A
A120A
A120A
A120A
A120A

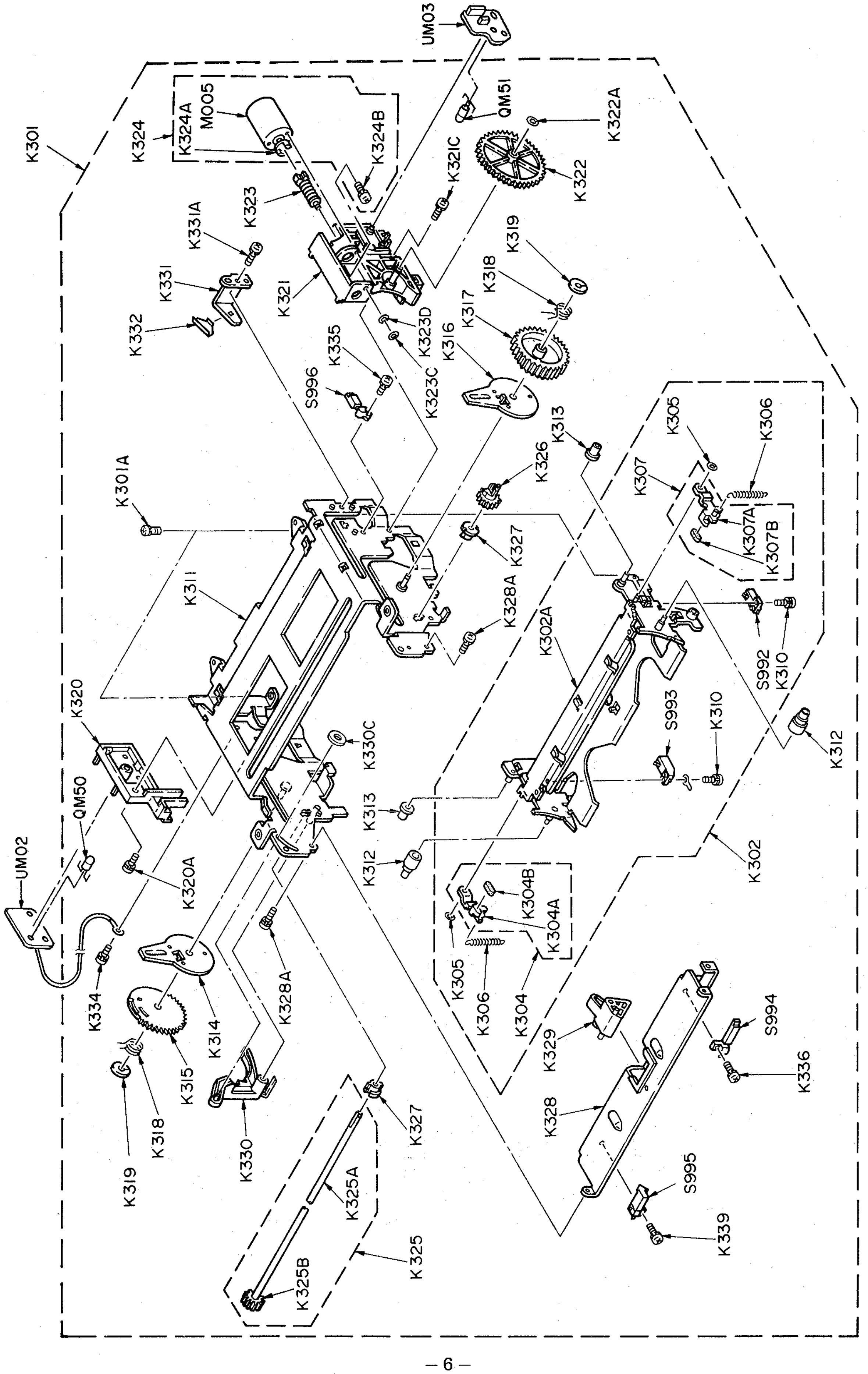
(3) Chassis Assembly (V-81G/W)


U202
U202A
V703
Q611C
U001A
U202B
Q611A
H001
Q611B
Q203A
Q203B
U001
Q802A
V801C
Q802B
V251
V251A
Q804A
Q806A
U802
V801B
T802A
A109
T802
Q802C
U101
U101A
V102
V802A
UA01
U803
H003A
Q802C
W211A
P801
V110A
V110
P801A
H002
H003
V802
V252
H002A
V801A
V801A
V252A
B602B
H002A
V801
V802B
B602
B602
(V-81G Only)
B601A
UL01A
V252A
V252
B601B
UL01
B602
B601B
UX02
GX01A
(V-81G Only)

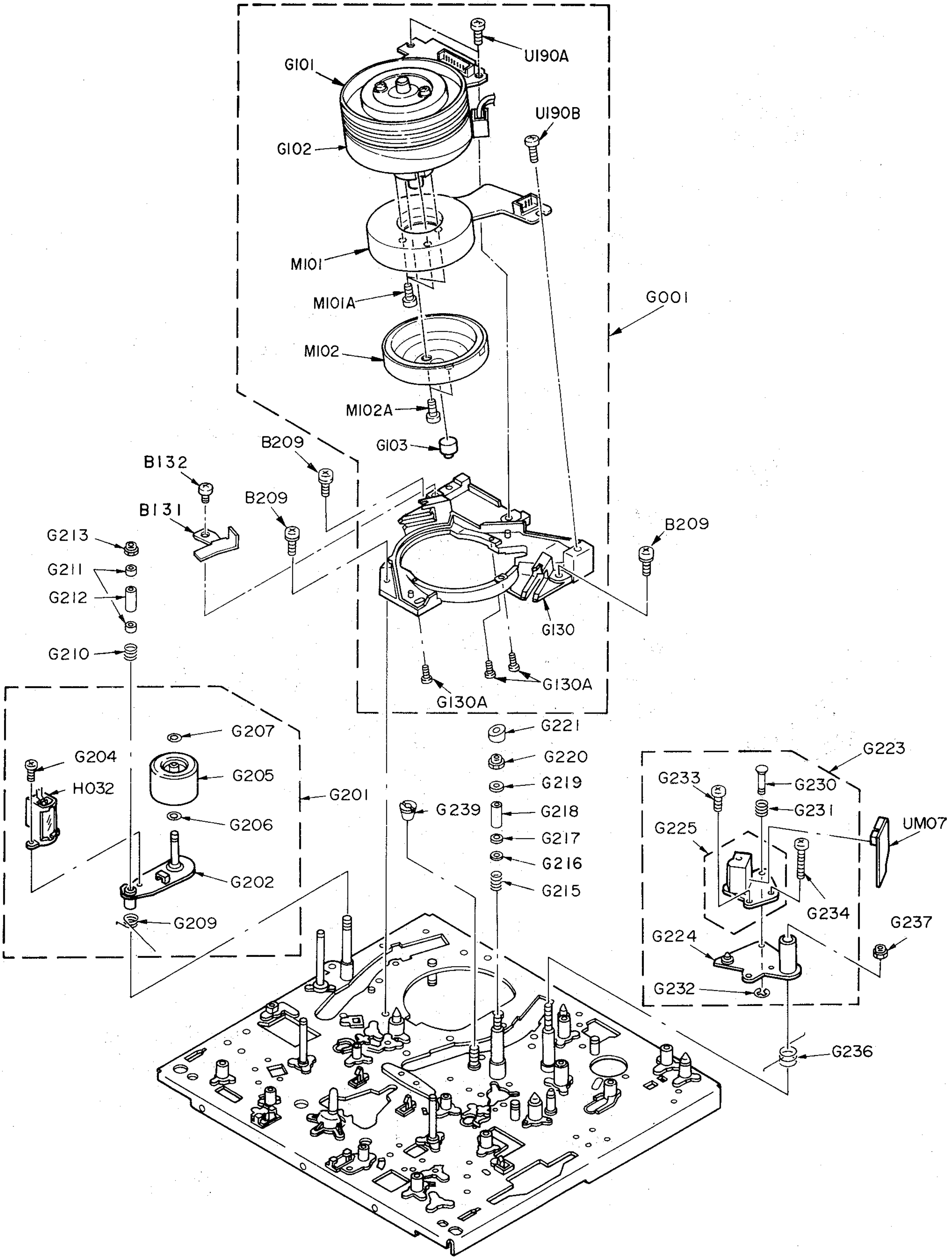
Chassis Assembly (V-83G/W)


U202
U202A
V703
Q611C
U001A
U202B
Q611A
H001
Q611B
Q203A
Q203B
U001
Q802A
V801C
Q802B
V251
V251A
Q804A
Q806A
U802
V801B
T802A
A109
T802
Q802C
U101
U101A
V102
V110A
U803
V802A
UA01
H003A
Q802C
W211A
P801
P801A
V110
H002
H003
V802
V252
V252A
H002A
V801A
V801A
B602B
H002A
V801
V802B
B602
B602
(V-83G Only)
B601A
UL01A
V252A
V252
B601B
UL01
B602
GX01A
A108
B601B
UX02
(V-83G Only)

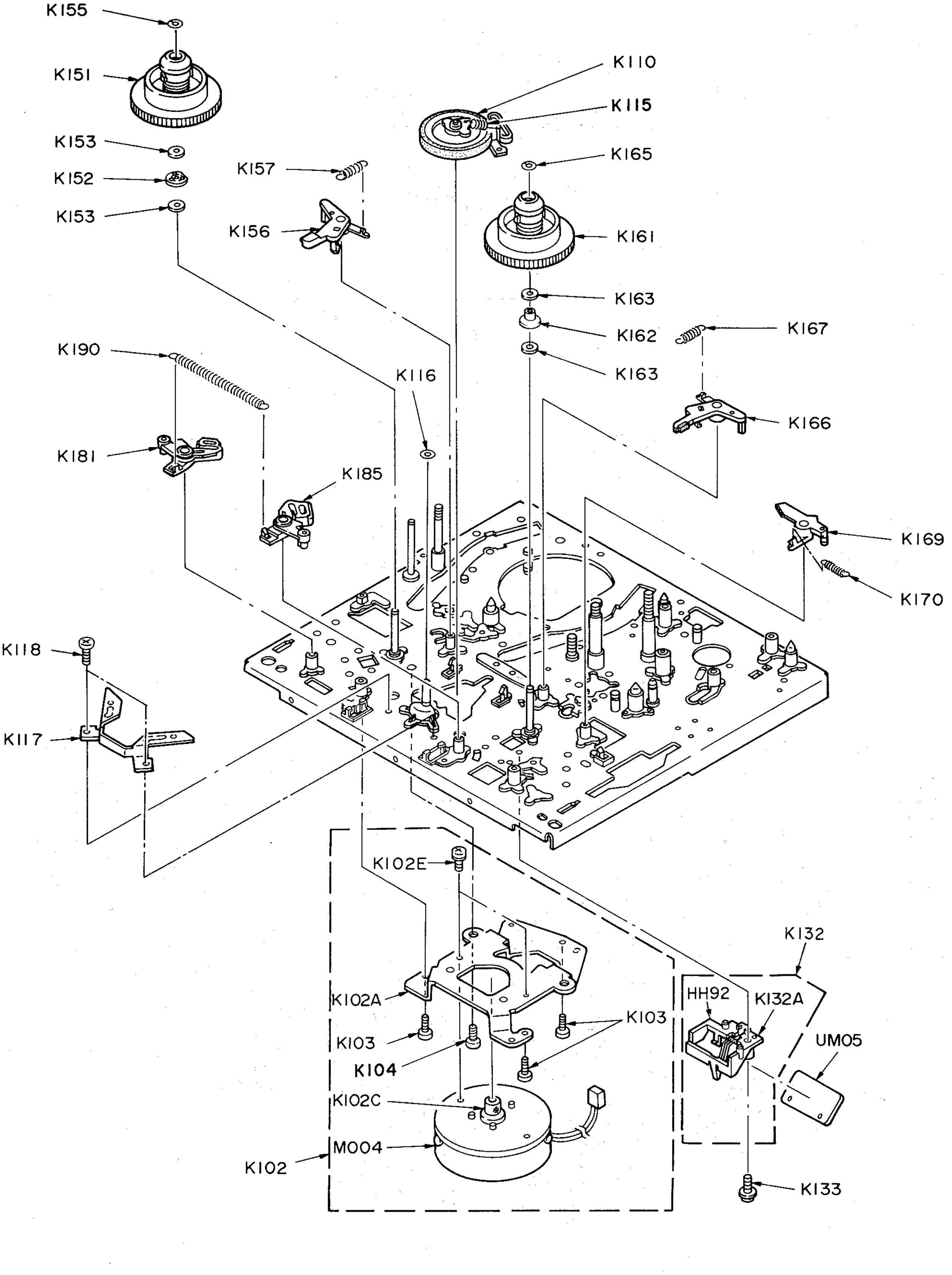
(4) Cassette Holder Assembly


UM03
QM51
K322A
K301
K324
K324A
M005
K324B
K321C
K322
K323
K331A
K319
K318
K331
K321
K317
K332
K323D
K323C
K335
K316
S996
K313
K305
K306
K301A
K326
K307
K307A
K307B
K327
K328A
K311
K302A
S992
K310
K320
K330C
S993
K310
K312
QM50
K313
K312
K302
UM02
K320A
K304B
K304A
K305
K306
K304
K334
K328A
K314
K315
K329
S994
K336
K318
K319
K330
K327
K328
K325A
K325
K325B
S995
K339

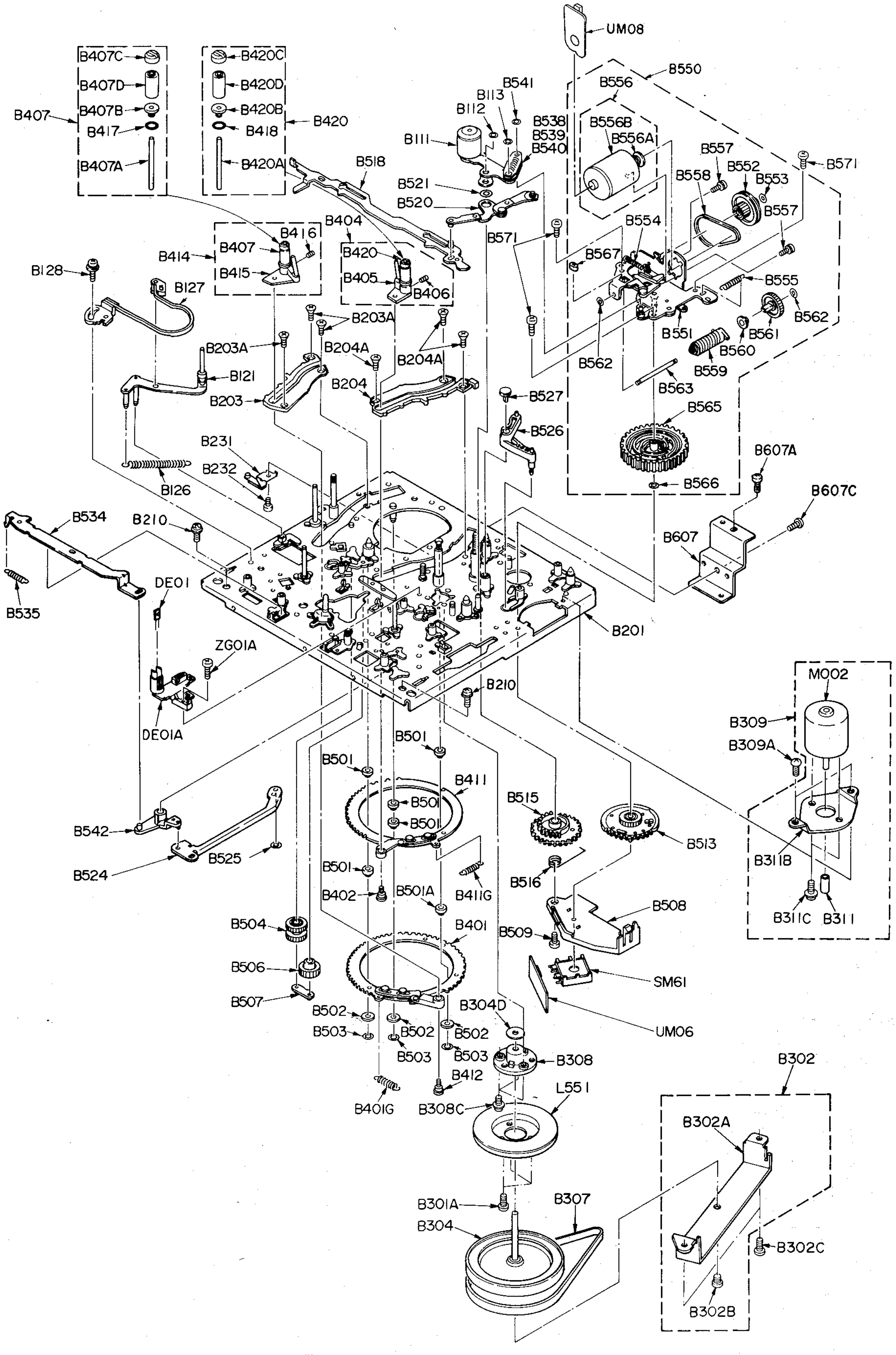
(5) Mechanical Parts (1)


G101
U190A
U190B
G102
M101
M101A
G001
M102
M102A
G103
B209
B132
B209
B131
B209
G213
G211
G212
G210
G130
G130A
G130A
G207
G204
G205
H032
G201
G206
G202
G209
G221
G220
G219
G218
G239
G217
G216
G215
G223
G233
G230
G231
G225
UM07
G234
G237
G224
G232
G236

(6) Mechanical Parts (2)


K155
K151
K153
K152
K153
K157
K156
K110
K115
K165
K161
K163
K162
K163
K167
K190
K116
K166
K181
K185
K169
K170
K118
K117
K102E
K132
K102A
HH92
K132A
K103
K103
UM05
K104
K102C
M004
K102
K133

(7) Mechanical Parts (3)


UM08
B550
B556
B541
B113
B112
B111
B538
B539
B540
B556B
B556A
B557
B552
B553
B558
B571
B557
B407C
B407D
B407B
B407
B417
B407A
B420C
B420D
B420B
B420
B418
B420A
B518
B521
B520
B571
B554
B567
B555
B562
B561
B551
B560
B559
B562
B563
B565
B416
B414
B407
B415
B404
B420
B405
B406
B128
B127
B203A
B203A
B121
B203
B204A
B204A
B204
B527
B526
B231
B232
B126
B607A
B566
B607C
B607
B534
B210
B535
DE01
B201
ZG01A
DE01A
B210
M002
B309
B309A
B501
B501
B411
B501
B501
B515
B513
B311B
B542
B524
B525
B501
B402
B501A
B411G
B516
B508
B311C
B311
B504
B401
B509
B506
SM61
B507
B502
B503
B502
B503
B304D
B502
B503
UM06
B308
B412
B401G
B308C
L551
B302
B302A
B301A
B307
B304
B302C
B302B

2.Mechanical Parts List

NOTICE:The part number must be used when ordering parts, in order to assist in processing, be sure to include the model number and description.

LOCATION NUMBER	PART NUMBER	DESCRIPTION
A101	70812513	Front Panel,V-83G
A101	70812540	Front Panel,V-83W
A101	70812536	Front Panel,V-81G
A101	70812545	Front Panel,V-81W
A101C	70863571	Door,V-83G
A101C	70863524	Door,V-83W
A101G	70863584	Door,V-81W
A101G	70863596	Door,V-81G
A103	70826418	Knob,V-81W
A103	70816850	Knob,V-81G
A104	70824236	Top Cover,V-81/83G
A104	70824233	Top Cover,V-81/83W
A104B	70863573	Door,V-81/83G
A104B	70863598	Door,V-81/83W
A105	70863575	Door
A105A	70351679	Spring
A108	70816978	Knob,V-83G/W
A109	70843229	Cover,V-81/83G
A109	70843185	Cover,V-81/83W
A120	70815125	Bottom Cover,V-81/83G
A120	70815118	Bottom Cover,V-81/83W
A701	70913531	Case,V-81G
A701	70913609	Case,V-81W
A701	70913511	Case,V-83G
A701	70913533	Case,V-83W
A702	70921193	Packing (U)
A703	70921194	Packing (L)
B111	70323310	Pinch Roller Assy
B112	70396196	Washer,Fl 3. 6x8x 0. 5mm
B113	70396193	Washer,Fl 2. 6x6x 0. 5mm
B121	70328319	Tension Lever Assy
B126	70351687	Spring
B127	70321842	Band Brake Assy
B132	70391349	Screw,2.6x3mm
B210	70391081	Screw, 4x12mm
B231	70321858	Earth Brush Assy
B232	70391345	Screw, 3x3mm
B302B	70338038	Ball Bearing
B302C	70391049	Screw, 3x8mm
B304	70335057	Capstan Flywheel Assy
B304D	70396186	Capstan Sleeve CAP
B307	70342125	Capstan Belt
B309	70320152	Motor Assy
B309A	70391049	Screw, 3x8mm
B311C	23718001	Screw, 2. 6x4mm
B405	70322354	T Slider Sub Assy
B406	70391361	Screw, 2. 6x3mm
B407	70322353	S Guide Roller Assy
B415	70322333	S Slider Sub Assy
B416	70391361	Screw, 2. 6x3mm
B417	70353115	O-ring
B418	70353115	O-ring
B420	70322352	T Guide Roller Assy
B503	70396196	Washer,Fl 3. 6x8x 0. 5mm
B504	70333198	Loading Ring Gear(A)
B506	70333199	Loading Ring Gear(B)
B507	70368116	Double Cap
B513	70333195	Phase Gear
B515	70333196	Loading Drive Gear
B516	70351676	Spring
B521	70347034	Polislider 4. 1x 6. 5x 0. 50mm
B525	70396193	Washer,Fl 2. 6x6x 0. 5mm
B526	70323304	Cam Lever Assy
B527	70368122	Stopper
B535	70351683	Spring
B541	70396193	Washer,Fl 2. 6x6x 0. 5mm
B542	70363305	Lever
B550	70312180	Drive Assy
B553	70396064	Washer,5. 0x 2. 1x 0. 5mm
B554	70351641	Spring
B556	70312179	Loading Motor Assy
B556B	70125069	DC Motor,12V
B557	23723264	Screw, 2. 6x4mm
B558	70342123	Loading Belt
B562	70396191	Washer,2.1x5x0.5mm
B565	70333197	Cam Gear
B566	70396193	Washer,Fl 2. 6x6x 0. 5mm
B607A	70391081	Screw, 4x12mm
DE01	70115406	Diode,LED GL450V
G001	70311328	Cylinder Assy
G101	70321968	Upper Cylinder Assy
G102	70321890	Lower Cylinder Assy
G103	70321601	Ground Cap Assy
G204	70391351	Screw, 2. 6x8mm
G205	70346035	Impedance Roller Assy
G206	70396050	Washer,3. 9x 2. 1x 0. 5mm
G207	70396190	Washer,Fl 1. 6x6x 0. 5mm
G209	70351694	Spring
G213	70393025	NUT, 3x3mm
G220	70393025	NUT, 3x3mm
G224	70328323	ACE Base T Assy
G225	70182056	ACE Sub Base Assy
G234	70391322	Adjust Screw
G236	70351666	Spring
G237	70393026	NUT, 3x4. 5mm
G239	70392015	Taper Nut
H001	70121061	Tuner,EG414X1
H001	70121057	Tuner,EG615X1
H002	70123075	RF Modulator,MMD151
H002	70123090	RF Modulator,MMD151X1
H003A	70391081	Screw, 4x12mm
H032	70183032	FE Head
HH92	A6090130	Hall Sensor,THS103A
K102	70326539	Reel Motor Assy
K110	70326538	Idler Assy
K115	70351703	Spring
K116	70396224	Polyslider,3.6x7.5x0.5mm
K118	23723264	Screw, 2. 6x4mm
K132	70316142	T Sensor Assy
K151	70317042	S Reel Table Assy
K152	70338075	Bearing
K153	70394153	Spacer
K155	70396193	Washer,Fl 2. 6x6x 0. 5mm
K156	70363300	Lever
K157	70351700	Spring
K161	70317039	T Reel Table Assy
K162	70338100	Thrust Washer
K163	70394153	Spacer
K165	70396193	Washer,Fl 2. 6x6x 0. 5mm
K166	70326535	Lever Assy
K167	70351685	Spring
K169	70326533	Reverse Brake Assy
K170	70351706	Spring
K181	70326536	S Brake Assy
K185	70326537	T Brake Assy
K190	70351684	Spring
K301	70314236	Front Loading Assy
K301A	70391049	Screw, 3x8mm
K305	70396151	Washer,Fl 2. 6
K310	23723204	Screw, 2x4mm
K319	70396187	Washer,Fl 3. 6x12x0. 5mm
K321C	23723310	Screw, 3x10mm
K322A	70396195	Washer,Fl 3. 6x6x 0. 5mm
K323	70324321	Worm Gear Assy
K323C	70396152	Washer,Fl 1. 6
K323D	70396050	Washer,3. 9x 2. 1x 0. 5mm
K324	70324323	Motor Assy
K327	70338073	Bearing

LOCATION NUMBER	PART NUMBER	DESCRIPTION
K328A	23723264	Screw, 2. 6x4㎜
K334	23723264	Screw, 2. 6x4㎜
K335	23723205	Screw, 2. 5x5㎜
L551	70321973	Coil Assy
M005	70125069	DC Motor,12V
⚠P801	23176740	Power Cord
⚠P801A	70846155	Cord Holder
QM50	70114347	Photo Transistor,PN202S-S
QM51	70114345	Photo Transistor,PN202S-R
RG01	70213105	Dew Heater
S992	23145486	Leaf Switch,(R)
S993	23145487	Leaf Switch,(L)
S994	23145485	Leaf Switch
S995	23145484	Leaf Switch
S996	23145565	Leaf Switch
⚠T802	23213671	Transformer,TPW1371AZ,V-81/83G
⚠T802	23213657	Transformer,TPW1371AN,V-81/83W
U202B	72471027	Screw,3x0.5x6㎜
U001	70194960	P C Board Assy,PIF,V-81/83G
U001	70194932	P C Board Assy,PIF,V-81/83W
U101	70197041	P C Board Assy,PRE AMP,V-81G
U101	70197092	P C Board Assy,PRE AMP,V-81W
U101	70194968	P C Board Assy,PRE AMP,V-83G
U101	70194936	P C Board Assy,PRE AMP,V-83W
U202	70194961	P C Board Assy,MAIN
U802	70194965	P C Board Assy,POWER 1,V-81/83G
U802	70194937	P C Board Assy,POWER 1,V-81/83W
U803	70194966	P C Board Assy,POWER 2,V-81/83G
U803	70194938	P C Board Assy,POWER 2,V-81/83G
UA01	70197040	P C Board Assy,SELECTOR,V-81G
UA01	70197091	P C Board Assy,SELECTOR,V-81W
UA01	70194963	P C Board Assy,SELECTOR,V-83G
UA01	70194934	P C Board Assy,SELECTOR,V-83W
UL01	70197039	P C Board Assy,LOGIC CTL,V-81G
UL01	70197090	P C Board Assy,LOGIC CTL,V-81W
UL01	70194964	P C Board Assy,LOGIC CTL,V-83G
UL01	70194935	P C Board Assy,LOGIC CTL,V-83W
UX02	70197038	P C Board Assy,TIMER,V-81G
UX02	70197089	P C Board Assy,TIMER,V-81W
UX02	70194962	P C Board Assy,TIMER,V-83G
UX02	70194933	P C Board Assy,TIMER,V-83W
V110A	70391349	Screw,2.6x3㎜
V251A	70391049	Screw, 3x8㎜
V252A	70391335	Screw,3x10㎜,V-81/83G
V801A	70391081	Screw, 4x12㎜
V802A	70391081	Screw, 4x12㎜
Y101	70941648	Owners Manual,V-81G
Y101	70941630	Owners Manual,V-83G
Y101	70941664	Owners Manual(1),V-81W
Y101	70941652	Owners Manual(1),V-83W
Y102	70941665	Owners Manual(2),V-81W
Y102	70941653	Owners Manual(2),V-83W
Y104	70933059	Cover
Y105	23364494	Cable
Y106	70148198	Remote Cont. Unit,VC-83G
Y106	70148160	Remote Cont. Unit,VC-73

LOCATION NUMBER	PART NUMBER	DESCRIPTION

3.Electrical Parts List

NOTICE:The part number must be used when ordering parts, in order to assist in processing, be sure to include the model number and description.

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
PIF BOARD (V-81/83G)				
U001	70194960	P C Board Assy,PIF		
INTEGRATED CIRCUITS				
IC002	B0354710	IC	TA7607AP	
IC006	B0325290	IC	TA7337P	
TRANSISTORS				
Q001	A6708871	Transistor	2SC388ATM	
Q003	A6048370	Transistor,FET	2SK30ATMGR	
Q004	A6317440	Transistor	2SC1815-Y	
Q005	A6332430	Transistor	2SC2458-Y	
Q007	A6002060	Transistor	RN1206	
Q008	A6332430	Transistor	2SC2458-Y	
Q009	A6534430	Transistor	2SA1048-Y	
Q010	A6332440	Transistor	2SC2458-GR	
Q011	A6002020	Transistor	RN1202	
Q012	A6002020	Transistor	RN1202	
Q013	A6002020	Transistor	RN1202	
Q014	A6012020	Transistor	RN2202	
Q015	A6012020	Transistor	RN2202	
Q016	A6012020	Transistor	RN2202	
Q017	A6534430	Transistor	2SA1048-Y	
Q018	A6534430	Transistor	2SA1048-Y	
Q019	A6534430	Transistor	2SA1048-Y	
Q020	A6332440	Transistor	2SC2458-GR	
Q021	A6332430	Transistor	2SC2458-Y	
Q022	A6534430	Transistor	2SA1048-Y	
Q023	A6002020	Transistor	RN1202	
Q024	A6002020	Transistor	RN1202	
Q025	A6332430	Transistor	2SC2458-Y	
Q026	A6002040	Transistor	RN1204	
Q027	A6002040	Transistor	RN1204	
Q028	A6332430	Transistor	2SC2458-Y	
Q029	A6048370	Transistor,FET	2SK30ATMGR	
Q030	A6002020	Transistor	RN1202	
Q301	A6533240	Transistor	2SA966-Y	
Q302	A6332430	Transistor	2SC2458-Y	
Q303	A6332430	Transistor	2SC2458-Y	
DIODES				
D001	A7160570	Diode	1SS176	
D002	A7160570	Diode	1SS176	
D003	A7160570	Diode	1SS176	
D004	A7160570	Diode	1SS176	
COILS				
L002	23261985	Coil,Choke	TRF9221	
L003	23262856	Coil,Fixed	TRF1452	
L004	23237986	Coil,Peaking	TRF4120AC	
L005	23238921	Coil,Peaking	TRF4120AC	
L051	23262853	Coil,PIF	TRF1454	
L052	23262852	Coil,AFT	TRF1455	
L053	70256001	Coil,Discri	LCA01	
L054	23262782	Coil,IF	TRF1108	
L055	23262781	Coil,IF	TRF1109	
L056	23262781	Coil,IF	TRF1109	
L301	23238932	Coil,Peaking	TF4159AC	
CAPACITORS				
C001	24474103	Cap,Ceramic	0. 01MF	N 50V
C002	24474103	Cap,Ceramic	0. 01MF	N 50V
C003	24232103	Cap,Ceramic	0. 01MF	Z 50V
C004	24474103	Cap,Ceramic	0. 01MF	N 50V
C005	24474102	Cap,Ceramic	1000PF	K 50V
C006	24636478	Cap,Electrolytic	0. 47MF	M 50V
C007	24436010	Cap,Ceramic	1PF	J 50V
C008	24436159	Cap,Ceramic	1. 5PF	J 50V
C009	24436160	Cap,Ceramic	16PF	J 50V
C010	24794470	Cap,Electrolytic	47MF	M 16V
C011	24232103	Cap,Ceramic	0. 01MF	Z 50V
C012	24636339	Cap,Electrolytic	3. 3MF	M 50V
C013	24636339	Cap,Electrolytic	3. 3MF	M 50V
C014	24636479	Cap,Electrolytic	4. 7MF	M 50V
C015	24436181	Cap,Ceramic	180PF	J 50V
C016	24797220	Cap,Electrolytic	22MF	M 50V
C017	24473470	Cap,Ceramic	47PF	J 50V
C018	24473470	Cap,Ceramic	47PF	J 50V
C019	24474103	Cap,Ceramic	0. 01MF	N 50V
C020	24636100	Cap,Electrolytic	10MF	M 50V
C021	24340300	Cap,Ceramic	30PF	J 50V
C022	24591682	Cap,Plastic	6800PF	J 50V
C023	24636100	Cap,Electrolytic	10MF	M 50V
C024	24436020	Cap,Ceramic	2PF	J 50V
C025	24232223	Cap,Ceramic	0. 022MF	Z 50V
C026	24232103	Cap,Ceramic	0. 01MF	Z 50V
C027	24232223	Cap,Ceramic	0. 022MF	Z 50V
C028	24591223	Cap,Plastic	0. 022MF	J 50V
C029	24636010	Cap,Electrolytic	1MF	M 50V
C030	24636010	Cap,Electrolytic	1MF	M 50V
C031	24232223	Cap,Ceramic	0. 022MF	Z 50V
C033	24353150	Cap,Ceramic	15PF	J 50V
C039	24636479	Cap,Electrolytic	4. 7MF	M 50V
C723	24436220	Cap,Ceramic	22PF	J 50V
RESISTORS				
R001	24366101	Res,Carbon	100	J 1/6W
R002	24366221	Res,Carbon	220	J 1/6W
R003	24366123	Res,Carbon	12K	J 1/6W
R004	24366471	Res,Carbon	470	J 1/6W
R005	24366202	Res,Carbon	2K	J 1/6W
R006	24366270	Res,Carbon	27	J 1/6W
R007	24366182	Res,Carbon	1. 8K	J 1/6W
R008	24366392	Res,Carbon	3. 9K	J 1/6W
R009	24366913	Res,Carbon	91K	J 1/6W
R010	24366271	Res,Carbon	270	J 1/6W
R011	24366824	Res,Carbon	820K	J 1/6W
R012	24366202	Res,Carbon	2K	J 1/6W
R013	24366471	Res,Carbon	470	J 1/6W
R014	24366103	Res,Carbon	10K	J 1/6W
R015	24366821	Res,Carbon	820	J 1/6W
R016	24366241	Res,Carbon	240	J 1/6W
R017	24366241	Res,Carbon	240	J 1/6W
R018	24366910	Res,Carbon	91	J 1/6W
R019	24366103	Res,Carbon	10K	J 1/6W
R020	24366202	Res,Carbon	2K	J 1/6W
R021	24366102	Res,Carbon	1K	J 1/6W
R022	24366102	Res,Carbon	1K	J 1/6W
R023	24366153	Res,Carbon	15K	J 1/6W
R024	24366242	Res,Carbon	2. 4K	J 1/6W
R025	24366182	Res,Carbon	1. 8K	J 1/6W
R026	24366105	Res,Carbon	1M	J 1/6W
R027	24366103	Res,Carbon	10K	J 1/6W
R028	24366474	Res,Carbon	470K	J 1/6W
R029	24366154	Res,Carbon	150K	J 1/6W
R030	24366164	Res,Carbon	160K	J 1/6W
R031	24366622	Res,Carbon	6. 2K	J 1/6W
R032	24366474	Res,Carbon	470K	J 1/6W
R033	24366363	Res,Carbon	36K	J 1/6W
R034	24366302	Res,Carbon	3K	J 1/6W
R035	24366242	Res,Carbon	2. 4K	J 1/6W
R036	24366512	Res,Carbon	5. 1K	J 1/6W
R037	24366333	Res,Carbon	33K	J 1/6W
R038	24366333	Res,Carbon	33K	J 1/6W
R039	24366164	Res,Carbon	160K	J 1/6W
R040	24366164	Res,Carbon	160K	J 1/6W
R041	24366683	Res,Carbon	68K	J 1/6W
R042	24366623	Res,Carbon	62K	J 1/6W
R043	24366184	Res,Carbon	180K	J 1/6W
R044	24366622	Res,Carbon	6. 2K	J 1/6W
R045	24366103	Res,Carbon	10K	J 1/6W
R046	24366474	Res,Carbon	470K	J 1/6W
R047	24366333	Res,Carbon	33K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R048	24366332	Res.Carbon	3. 3K	J 1/6W
R049	24366151	Res.Carbon	150	J 1/6W
R051	24066947	Res.Variable	500K	
R052	24066953	Res.Variable	100K	
R060	24366270	Res.Carbon	27	J 1/6W
R061	24366103	Res.Carbon	10K	J 1/6W
R062	24366331	Res.Carbon	330	J 1/6W
R063	24366331	Res.Carbon	330	J 1/6W
R064	24366101	Res.Carbon	100	J 1/6W
R065	24366104	Res.Carbon	100K	J 1/6W
R066	24366104	Res.Carbon	100K	J 1/6W
R067	24366914	Res.Carbon	910K	J 1/6W
R068	24366224	Res.Carbon	220K	J 1/6W
R069	24366105	Res.Carbon	1M	J 1/6W
R301	24366750	Res.Carbon	75	J 1/6W
R302	24366103	Res.Carbon	10K	J 1/6W
R303	24366202	Res.Carbon	2K	J 1/6W
R304	24366223	Res.Carbon	22K	J 1/6W
R305	24366223	Res.Carbon	22K	J 1/6W
R306	24366223	Res.Carbon	22K	J 1/6W
R307	24366202	Res.Carbon	2K	J 1/6W
R725	24366152	Res.Carbon	1. 5K	J 1/6W
R726	24366152	Res.Carbon	1. 5K	J 1/6W
MISCELLANEOUS				
P301	23363526	Phono Jack		
P302	23363252	Phono Jack		
P710	23363254	Phono Jack		
P711	23363253	Phono Jack		
S301	23145436	Slide Switch,2C2P		
Z001	A5611192	Filter,PIF,F1037C		
Z002	23107972	Video Trap,5. 5MHz		
Z003	23107947	Filter,SIF,5. 5MHz		
PIF BOARD (V-81/83W)				
U001	70194932	P C Board Assy,PIF		
INTEGRATED CIRCUITS				
IC002	B0354710	IC	TA7607AP	
IC005	B0325290	IC	TA7337P	
TRANSISTORS				
Q001	A6708871	Transistor	2SC388ATM	
Q003	A6317440	Transistor	2SC1815-Y	
Q006	A6002060	Transistor	RN1206	
Q007	A6332430	Transistor	2SC2458-Y	
Q008	A6332430	Transistor	2SC2458-Y	
Q009	A6534430	Transistor	2SA1048-Y	
Q061	A6048350	Transistor,FET	2SK30ATM	
Q062	A6332430	Transistor	2SC2458-Y	
Q063	A6002020	Transistor	RN1202	
Q064	A6002020	Transistor	RN1202	
Q065	A6002020	Transistor	RN1202	
Q066	A6012020	Transistor	RN2202	
Q067	A6012020	Transistor	RN2202	
Q068	A6332430	Transistor	2SC2458-Y	
Q069	A6332440	Transistor	2SC2458-GR	
Q070	A6332440	Transistor	2SC2458-GR	
Q071	A6534430	Transistor	2SA1048-Y	
Q072	A6048370	Transistor,FET	2SK30ATMGR	
Q073	A6534430	Transistor	2SA1048-Y	
Q074	A6534430	Transistor	2SA1048-Y	
Q075	A6534430	Transistor	2SA1048-Y	
Q076	A6002020	Transistor	RN1202	
Q077	A6002020	Transistor	RN1202	
Q078	A6534440	Transistor	2SA1048-GR	
Q301	A6533240	Transistor	2SA966-Y	
Q302	A6332430	Transistor	2SC2458-Y	
Q303	A6332430	Transistor	2SC2458-Y	
DIODES				
D001	A7160570	Diode	1SS176	
D002	A7160570	Diode	1SS176	
D061	A7160570	Diode	1SS176	
D062	A7160570	Diode	1SS176	
D063	A7160570	Diode	1SS176	
COILS				
L001	23261983	Coil.Choke	TRF9223	
L002	23261985	Coil.Choke	TRF9221	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
L003	23262856	Coil,Fixed	TRF1452	
L004	23237986	Coil,Peaking	TRF4120AC	
L005	23238921	Coil,Peaking	TRF4120AC	
L051	23262853	Coil,PIF	TRF1454	
L052	23262852	Coil,AFT	TRF1455	
L053	70256001	Coil,Discri	LCA01	
L301	23238932	Coil,Peaking	TRF4159AC	
CAPACITORS				
C001	24474103	Cap,Ceramic	0. 01MF	N 50V
C002	24474103	Cap,Ceramic	0. 01MF	N 50V
C003	24474103	Cap,Ceramic	0. 01MF	N 50V
C004	24474103	Cap,Ceramic	0. 01MF	N 50V
C005	24474102	Cap,Ceramic	1000PF	K 50V
C006	24636478	Cap,Electrolytic	0. 47MF	M 50V
C007	24436159	Cap,Ceramic	1. 5PF	J 50V
C008	24436010	Cap,Ceramic	1PF	J 50V
C009	24436160	Cap,Ceramic	16PF	J 50V
C010	24794470	Cap,Electrolytic	47MF	M 16V
C011	24232103	Cap,Ceramic	0. 01MF	Z 50V
C014	24636479	Cap,Electrolytic	4. 7MF	M 50V
C015	24436820	Cap,Ceramic	82PF	J 50V
C017	24473470	Cap,Ceramic	47PF	J 50V
C018	24473470	Cap,Ceramic	47PF	J 50V
C019	24474103	Cap,Ceramic	0. 01MF	N 50V
C020	24636100	Cap,Electrolytic	10MF	M 50V
C021	24340430	Cap,Ceramic	43PF	J 50V
C022	24591682	Cap,Plastic	6800PF	J 50V
C023	24636100	Cap,Electrolytic	10MF	M 50V
C030	24232223	Cap,Ceramic	0. 022MF	Z 50V
C031	24797220	Cap,Electrolytic	22MF	M 50V
C032	24636478	Cap,Electrolytic	0. 47MF	M 50V
C033	24794470	Cap,Electrolytic	47MF	M 16V
C061	24232103	Cap,Ceramic	0. 01MF	Z 50V
C062	24636339	Cap,Electrolytic	3. 3MF	M 50V
C063	24636339	Cap,Electrolytic	3. 3MF	M 50V
C723	24436220	Cap,Ceramic	22PF	J 50V
RESISTORS				
R001	24366750	Res,Carbon	75	J 1/6W
R002	24366301	Res,Carbon	300	J 1/6W
R003	24366562	Res,Carbon	5. 6K	J 1/6W
R004	24366471	Res,Carbon	470	J 1/6W
R005	24366102	Res,Carbon	1K	J 1/6W
R006	24366270	Res,Carbon	27	J 1/6W
R007	24366821	Res,Carbon	820	J 1/6W
R008	24366392	Res,Carbon	3. 9K	J 1/6W
R009	24366683	Res,Carbon	68K	J 1/6W
R010	24366221	Res,Carbon	220	J 1/6W
R011	24366824	Res,Carbon	820K	J 1/6W
R012	24366512	Res,Carbon	5. 1K	J 1/6W
R013	24366151	Res,Carbon	150	J 1/6W
R014	24366202	Res,Carbon	2K	J 1/6W
R015	24366821	Res,Carbon	820	J 1/6W
R016	24366241	Res,Carbon	240	J 1/6W
R017	24366241	Res,Carbon	240	J 1/6W
R018	24366111	Res,Carbon	110	J 1/6W
R021	24366102	Res,Carbon	1K	J 1/6W
R022	24366102	Res,Carbon	1K	J 1/6W
R023	24366103	Res,Carbon	10K	J 1/6W
R024	24366202	Res,Carbon	2K	J 1/6W
R025	24366202	Res,Carbon	2K	J 1/6W
R030	24366622	Res,Carbon	6. 2K	J 1/6W
R031	24366103	Res,Carbon	10K	J 1/6W
R032	24366202	Res,Carbon	2K	J 1/6W
R034	24366821	Res,Carbon	820	J 1/6W
R035	24366561	Res,Carbon	560	J 1/6W
R036	24366911	Res,Carbon	910	G 1/6W
R037	24366824	Res,Carbon	820K	J 1/6W
R038	24366182	Res,Carbon	1. 8K	J 1/6W
R039	24366152	Res,Carbon	1. 5K	J 1/6W
R040	24366333	Res,Carbon	33K	J 1/6W
R041	24366333	Res,Carbon	33K	J 1/6W
R051	24066947	Res,Variable	500K	
R052	24066953	Res,Variable	100K	
R061	24366105	Res,Carbon	1M	J 1/6W
R062	24366203	Res,Carbon	20K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R063	24366204	Res,Carbon	200K	J 1/6W
R064	24366363	Res,Carbon	36K	J 1/6W
R065	24366154	Res,Carbon	150K	J 1/6W
R066	24366154	Res,Carbon	150K	J 1/6W
R068	24366273	Res,Carbon	27K	J 1/6W
R069	24366432	Res,Carbon	4. 3K	J 1/6W
R070	24366562	Res,Carbon	5. 6K	J 1/6W
R071	24366562	Res,Carbon	5. 6K	J 1/6W
R072	24366513	Res,Carbon	51K	J 1/6W
R073	24366513	Res,Carbon	51K	J 1/6W
R074	24366105	Res,Carbon	1M	J 1/6W
R075	24366204	Res,Carbon	200K	J 1/6W
R076	24366204	Res,Carbon	200K	J 1/6W
R077	24366154	Res,Carbon	150K	J 1/6W
R078	24366154	Res,Carbon	150K	J 1/6W
R079	24366563	Res,Carbon	56K	J 1/6W
R080	24366623	Res,Carbon	62K	J 1/6W
R081	24366154	Res,Carbon	150K	J 1/6W
R082	24366244	Res,Carbon	240K	J 1/6W
R083	24366684	Res,Carbon	680K	J 1/6W
R084	24366684	Res,Carbon	680K	J 1/6W
R085	24366474	Res,Carbon	470K	J 1/6W
R301	24366750	Res,Carbon	75	J 1/6W
R302	24366103	Res,Carbon	10K	J 1/6W
R303	24366202	Res,Carbon	2K	J 1/6W
R304	24366223	Res,Carbon	22K	J 1/6W
R305	24366223	Res,Carbon	22K	J 1/6W
R306	24366223	Res,Carbon	22K	J 1/6W
R307	24366202	Res,Carbon	2K	J 1/6W
R725	24366152	Res,Carbon	1. 5K	J 1/6W
R726	24366152	Res,Carbon	1. 5K	J 1/6W
MISCELLANEOUS				
P301	23363526	Phono Jack		
P302	23363252	Phono Jack		
P710	23363254	Phono Jack		
P711	23363253	Phono Jack		
S301	23145436	Slide Switch,2C2P		
Z001	A5611110	Filter,F1034, 38. 9MHz		
Z002	23107972	Video Trap,5. 5MHz		
Z003	23107947	Filter,SIF,5. 5MHz		
MAIN BOARD				
U202	70194961	P C Board Assy,MAIN		
INTEGRATED CIRCUITS				
IC121	B0379070	IC	TA8607P	
IC122	B0324050	IC	TA7302P	
IC201	B0379050	IC	TA8605N	
IC202	B0379060	IC	TA8606N	
IC401	70119508	IC	BA7267S	
IC402	70119509	IC	BU2763S	
IC481	70119487	IC	BA7025L	
IC501	B0272620	IC	TD6360P	
IC502	B0351500	IC	TA75902P	
IC503	B0349260	IC	TA75393P	
IC601	70119561	IC	TMP4746N5759P	
IC602	B0320635	IC	TA7288P	
IC603	B0320440	IC	TA7267P	
IC604	B0349260	IC	TA75393P	
IC605	70119577	IC	PST520D	
IC701	70119518	IC	LA7090	
IC702	B0325536	IC	TA7361AP	
TRANSISTORS				
Q123	A6332430	Transistor	2SC2458-Y	
Q124	A6332430	Transistor	2SC2458-Y	
Q125	A6332430	Transistor	2SC2458-Y	
Q126	A6332430	Transistor	2SC2458-Y	
Q127	A6332430	Transistor	2SC2458-Y	
Q128	A6332430	Transistor	2SC2458-Y	
Q129	A6002020	Transistor	RN1202	
Q130	A6012030	Transistor	RN2203	
Q131	A6325540	Transistor	SC2236-Y	
Q132	A6012020	Transistor	RN2202	
Q203	A6868350	Transistor	2SD1413	
Q204	A6332430	Transistor	2SC2458-Y	
Q205	A6332430	Transistor	2SC2458-Y	
Q206	A6332430	Transistor	2SC2458-Y	
Q207	A6332430	Transistor	2SC2458-Y	
Q208	A6534430	Transistor	2SA1048-Y	
Q209	A6332430	Transistor	2SC2458-Y	
Q210	A6332430	Transistor	2SC2458-Y	
Q211	A6332430	Transistor	2SC2458-Y	
Q212	A6332430	Transistor	2SC2458-Y	
Q213	A6012030	Transistor	RN2203	
Q214	A6012040	Transistor	RN2204	
Q215	A6012040	Transistor	RN2204	
Q216	A6534430	Transistor	2SA1048-Y	
Q217	A6002010	Transistor	RN1201	
Q218	A6534430	Transistor	2SA1048-Y	
Q219	A6534430	Transistor	2SA1048-Y	
Q220	A6534430	Transistor	2SA1048-Y	
Q221	A6534430	Transistor	2SA1048-Y	
Q403	A6332430	Transistor	2SC2458-Y	
Q404	A6332430	Transistor	2SC2458-Y	
Q405	A6332430	Transistor	2SC2458-Y	
Q406	A6534430	Transistor	2SA1048-Y	
Q407	A6534430	Transistor	2SA1048-Y	
Q408	A6332430	Transistor	2SC2458-Y	
Q409	A6002020	Transistor	RN1202	
Q410	A6012040	Transistor	RN2204	
Q411	A6332430	Transistor	2SC2458-Y	
Q412	A6332430	Transistor	2SC2458-Y	
Q413	A6332430	Transistor	2SC2458-Y	
Q414	A6534430	Transistor	2SA1048-Y	
Q482	A6332430	Transistor	2SC2458-Y	
Q505	A6002020	Transistor	RN1202	
Q506	A6002030	Transistor	RN1203	
Q507	A6012020	Transistor	RN2202	
Q508	A6002020	Transistor	RN1202	
Q509	A6534430	Transistor	2SA1048-Y	
Q510	A6002040	Transistor	RN1204	
Q511	A6002010	Transistor	RN1201	
Q512	A6002040	Transistor	RN1204	
Q513	A6002040	Transistor	RN1204	
Q514	A6002030	Transistor	RN1203	
Q516	A6012040	Transistor	RN2204	
Q517	A6534430	Transistor	2SA1048-Y	
Q533	A6868350	Transistor	2SD1413	
Q534	A6325540	Transistor	SC2236-Y	
Q610	A6012010	Transistor	RN2201	
Q611	A6868350	Transistor	2SD1413	
Q613	A6002030	Transistor	RN1203	
Q615	A6534430	Transistor	2SA1048-Y	
Q616	A6533240	Transistor	2SA966-Y	
Q617	A6534430	Transistor	2SA1048-Y	
Q618	A6002060	Transistor	RN1206	
Q619	A6002060	Transistor	RN1206	
Q620	A6325540	Transistor	SC2236-Y	
Q621	A6002050	Transistor	RN1205	
Q623	A6002060	Transistor	RN1206	
Q624	A6002040	Transistor	RN1204	
Q625	A6639320	Transistor	2SB1015Y	
Q626	A6332430	Transistor	2SC2458-Y	
Q630	A6002020	Transistor	RN1202	
Q631	A6332430	Transistor	2SC2458-Y	
Q632	A6332430	Transistor	2SC2458-Y	
Q703	A6002040	Transistor	RN1204	
Q705	A6319300	Transistor	2SC1959-Y	
DIODES				
D121	A7160570	Diode	1SS176	
D201	A7160570	Diode	1SS176	
D202	A7160570	Diode	1SS176	
D203	A7160570	Diode	1SS176	
D204	A7160570	Diode	1SS176	
D205	A7160570	Diode	1SS176	
D206	A7160570	Diode	1SS176	
D208	A7160570	Diode	1SS176	
D209	A7160570	Diode	1SS176	
D401	A7160570	Diode	1SS176	
D402	A7160570	Diode	1SS176	
D403	A7160570	Diode	1SS176	
D481	A7160570	Diode	1SS176	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
D501	A7160570	Diode	1SS176	
D502	A7160570	Diode	1SS176	
D505	A7160570	Diode	1SS176	
D507	A7160570	Diode	1SS176	
D508	70115304	Diode	DA203	
D510	A7152800	Diode	1SS227	
D511	70115303	Diode	DAP201	
D512	A7160570	Diode	1SS176	
D513	A7152800	Diode	1SS227	
D514	A7152800	Diode	1SS227	
D515	A7160570	Diode	1SS176	
D516	A7160570	Diode	1SS176	
D517	A7160570	Diode	1SS176	
D519	A7151500	Diode	1SS201	
D520	A7160570	Diode	1SS176	
D521	A7160570	Diode	1SS176	
D601	A7110076	Diode,Zener	05Z6.2Y	
D602	70115303	Diode	DAP201	
D604	A7160570	Diode	1SS176	
D605	A7160570	Diode	1SS176	
D606	A7160570	Diode	1SS176	
D607	A7160570	Diode	1SS176	
D611	A7160570	Diode	1SS176	
COILS				
L121	23238703	Coil,Peaking	TRF4820AJ	
L122	23238911	Coil,Peaking	TRF4820AC	
L123	23237973	Coil,Peaking	TRF4151AC	
L126	23237975	Coil,Peaking	TRF4101AC	
L127	23237981	Coil,Peaking	TRF4330AC	
L128	23237987	Coil,Peaking	TRF4100AC	
L130	23238703	Coil,Peaking	TRF4820AJ	
L131	23238768	Coil,Peaking	TRF4681AC	
L132	23238768	Coil,Peaking	TRF4681AC	
L133	23238906	Coil,Peaking	TRF4221AC	
L136	23238756	Coil,Peaking	TRF4222AC	
L137	23237813	Coil,Peaking	TRF4102AC	
L202	23237985	Coil,Peaking	TRF4150AC	
L203	23238918	Coil,Peaking	TRF4220AC	
L204	23237969	Coil,Peaking	TRF4331AC	
L205	23238904	Coil,Peaking	TRF4331AC	
L207	23238904	Coil,Peaking	TRF4331AC	
L208	23237968	Coil,Peaking	TRF4391AC	
L401	23237982	Coil,Peaking	TRF4270AC	
L402	23237973	Coil,Peaking	TRF4151AC	
L403	23237982	Coil,Peaking	TRF4270AC	
L404	23237985	Coil,Peaking	TRF4150AC	
L405	23238912	Coil,Peaking	TRF4680AC	
L451	70272005	Coil,Resonant	LAA02	
L601	23238921	Coil,Peaking	TRF4120AC	
L701	23238723	Coil,Peaking	TRF4682AC	
L702	23237817	Coil,Peaking	TRF4681AC	
CAPACITORS				
C121	24633220	Cap,Electrolytic	22MF	M 16V
C123	24232103	Cap,Ceramic	0. 01MF	Z 50V
C124	24473470	Cap,Ceramic	47PF	J 50V
C125	24436181	Cap,Ceramic	180PF	J 50V
C126	24436151	Cap,Ceramic	150PF	J 50V
C127	24636010	Cap,Electrolytic	1MF	M 50V
C128	24474103	Cap,Ceramic	0. 01MF	N 16V
C129	24474103	Cap,Ceramic	0. 01MF	N 16V
C130	24474103	Cap,Ceramic	0. 01MF	N 16V
C131	24474103	Cap,Ceramic	0. 01MF	N 16V
C132	24436511	Cap,Ceramic	510PF	J 50V
C133	24436070	Cap,Ceramic	7PF	J 50V
C134	24436150	Cap,Ceramic	15PF	J 50V
C135	24474103	Cap,Ceramic	0. 01MF	N 50V
C136	24474103	Cap,Ceramic	0. 01MF	N 50V
C137	24436101	Cap,Ceramic	100PF	J 50V
C138	24632470	Cap,Electrolytic	47MF	M 10V
C139	24232103	Cap,Ceramic	0. 01MF	Z 50V
C140	24474102	Cap,Ceramic	1000PF	K 50V
C141	24474103	Cap,Ceramic	0. 01MF	N 50V
C142	24436180	Cap,Ceramic	18PF	J 50V
C143	24474103	Cap,Ceramic	0. 01MF	N 50V
C144	24473560	Cap,Ceramic	56PF	J 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C145	24473120	Cap,Ceramic	12PF	J 50V
C146	24474103	Cap,Ceramic	0. 01MF	N 50V
C147	24436560	Cap,Ceramic	56PF	J 50V
C148	24473130	Cap,Ceramic	13PF	J 50V
C149	24474103	Cap,Ceramic	0. 01MF	N 50V
C161	24538104	Cap,Plastic	0. 1MF	J 50V
C162	24436471	Cap,Ceramic	470PF	J 50V
C163	24436820	Cap,Ceramic	82PF	J 50V
C164	24474103	Cap,Ceramic	0. 01MF	N 50V
C165	24636010	Cap,Electrolytic	1MF	M 50V
C166	24474103	Cap,Ceramic	0. 01MF	N 50V
C167	24474103	Cap,Ceramic	0. 01MF	N 50V
C168	24474103	Cap,Ceramic	0. 01MF	N 50V
C169	24474103	Cap,Ceramic	0. 01MF	N 50V
C170	24633330	Cap,Electrolytic	33MF	M 16V
C171	24232103	Cap,Ceramic	0. 01MF	Z 50V
C172	24851104	Cap,Ceramic	0. 1MF	K 25V
C173	24436181	Cap,Ceramic	180PF	J 50V
C201	24633220	Cap,Electrolytic	22MF	M 16V
C203	24633330	Cap,Electrolytic	33MF	M 16V
C204	24794470	Cap,Electrolytic	47MF	M 16V
C205	24793101	Cap,Electrolytic	100MF	M 10V
C206	24473560	Cap,Ceramic	56PF	J 50V
C207	24793101	Cap,Electrolytic	100MF	M 10V
C208	24851104	Cap,Ceramic	0. 1MF	K 25V
C209	24353101	Cap,Ceramic	100PF	J 50V
C210	24591103	Cap,Plastic	0. 01MF	J 50V
C211	24591822	Cap,Plastic	8200PF	J 50V
C212	24436221	Cap,Ceramic	220PF	J 50V
C213	24436151	Cap,Ceramic	150PF	J 50V
C214	24632470	Cap,Electrolytic	47MF	M 10V
C215	24232103	Cap,Ceramic	0. 01MF	Z 50V
C216	24636478	Cap,Electrolytic	0. 47MF	M 50V
C217	24636479	Cap,Electrolytic	4. 7MF	M 50V
C218	24636010	Cap,Electrolytic	1MF	M 50V
C219	24636479	Cap,Electrolytic	4. 7MF	M 50V
C220	24474102	Cap,Ceramic	1000PF	K 50V
C221	24793101	Cap,Electrolytic	100MF	M 10V
C222	24232103	Cap,Ceramic	0. 01MF	Z 50V
C223	24474103	Cap,Ceramic	0. 01MF	N 50V
C224	24474103	Cap,Ceramic	0. 01MF	N 50V
C225	24436820	Cap,Ceramic	82PF	J 50V
C226	24473180	Cap,Ceramic	18PF	J 50V
C227	24591562	Cap,Plastic	5600PF	J 50V
C228	24436331	Cap,Ceramic	330PF	J 50V
C229	24473100	Cap,Ceramic	10PF	J 50V
C230	24474103	Cap,Ceramic	0. 01MF	N 50V
C231	24474103	Cap,Ceramic	0. 01MF	N 50V
C232	24633100	Cap,Electrolytic	10MF	M 16V
C233	24474103	Cap,Ceramic	0. 01MF	N 50V
C234	24632470	Cap,Electrolytic	47MF	M 10V
C235	24636479	Cap,Electrolytic	4. 7MF	M 50V
C236	24473120	Cap,Ceramic	12PF	J 50V
C237	24474103	Cap,Ceramic	0. 01MF	N 50V
C238	24636010	Cap,Electrolytic	1MF	M 50V
C239	24636010	Cap,Electrolytic	1MF	M 50V
C241	24473330	Cap,Ceramic	33PF	J 50V
C242	24474103	Cap,Ceramic	0. 01MF	N 50V
C243	24851223	Cap,Ceramic	0.022MF	K 25V
C244	24591432	Cap,Plastic	4300PF	J 50V
C245	24591392	Cap,Plastic	3900PF	J 50V
C246	24436221	Cap,Ceramic	220PF	J 50V
C247	24792471	Cap,Electrolytic	470MF	M 6.3V
C248	24591512	Cap,Plastic	5100PF	J 50V
C249	24851223	Cap,Ceramic	0.022MF	K 25V
C261	24632470	Cap,Electrolytic	47MF	M 10V
C262	24632470	Cap,Electrolytic	47MF	M 10V
C263	24436560	Cap,Ceramic	56PF	J 50V
C264	24436621	Cap,Ceramic	620PF	J 50V
C401	24232103	Cap,Ceramic	0. 01MF	Z 50V
C402	24232103	Cap,Ceramic	0. 01MF	Z 50V
C403	24474103	Cap,Ceramic	0. 01MF	N 50V
C404	24474103	Cap,Ceramic	0. 01MF	N 50V
C405	24436820	Cap,Ceramic	82PF	J 50V
C406	24474103	Cap,Ceramic	0. 01MF	N 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C407	24436471	Cap,Ceramic	470PF	J 50V
C408	24632470	Cap,Electrolytic	47MF	M 10V
C409	24474103	Cap,Ceramic	0. 01MF	N 50V
C410	24473270	Cap,Ceramic	27PF	J 50V
C411	24474102	Cap,Ceramic	1000PF	K 50V
C412	24474103	Cap,Ceramic	0. 01MF	N 50V
C413	24538104	Cap,Plastic	0. 1MF	J 50V
C414	24591223	Cap,Plastic	0. 022MF	J 50V
C415	24206478	Cap,Electrolytic	0.47MF	M 50V
C416	24202470	Cap,Electrolytic	47MF	M 10V
C417	24474103	Cap,Ceramic	0. 01MF	N 50V
C418	24474103	Cap,Ceramic	0. 01MF	N 50V
C419	24474103	Cap,Ceramic	0. 01MF	N 50V
C420	24202101	Cap,Electrolytic	100MF	M 10V
C421	24591102	Cap,Plastic	1000PF	J 50V
C422	24206010	Cap,Electrolytic	1MF	M 50V
C423	24202470	Cap,Electrolytic	47MF	M 10V
C424	24353150	Cap,Ceramic	15PF	J 50V
C425	24353080	Cap,Ceramic	8PF	J 50V
C426	24212472	Cap,Ceramic	4700PF	K 50V
C427	24436470	Cap,Ceramic	47PF	J 50V
C429	24212102	Cap,Ceramic	1000PF	K 50V
C430	24232103	Cap,Ceramic	0. 01MF	Z 50V
C431	24232103	Cap,Ceramic	0. 01MF	Z 50V
C433	24632470	Cap,Electrolytic	47MF	M 10V
C434	24232103	Cap,Ceramic	0. 01MF	Z 50V
C435	24212102	Cap,Ceramic	1000PF	K 50V
C436	24206229	Cap,Electrolytic	2.2MF	M 50V
C437	24591103	Cap,Plastic	0. 01MF	J 50V
C438	24232103	Cap,Ceramic	0. 01MF	Z 50V
C439	24538473	Cap,Plastic	0. 047MF	J 50V
C440	24436030	Cap,Ceramic	3PF	J 50V
C441	24206229	Cap,Electrolytic	2.2MF	M 50V
C455	24093986	Cap,Variable	2. 8MF	
C481	24212102	Cap,Ceramic	1000PF	K 50V
C482	24633330	Cap,Electrolytic	33MF	M 16V
C483	24206478	Cap,Electrolytic	0.47MF	M 50V
C484	24212102	Cap,Ceramic	1000PF	K 50V
C485	24591223	Cap,Plastic	0. 022MF	J 50V
C486	24202470	Cap,Electrolytic	47MF	M 10V
C487	24203330	Cap,Electrolytic	33MF	M 16V
C501	24794470	Cap,Electrolytic	47MF	M 16V
C502	24474102	Cap,Ceramic	1000PF	K 50V
C503	24591123	Cap,Plastic	0.012MF	J 50V
C504	24591123	Cap,Plastic	0.012MF	J 50V
C505	24591473	Cap,Plastic	0. 047MF	J 50V
C506	24636478	Cap,Electrolytic	0. 47MF	M 50V
C507	24591103	Cap,Plastic	0. 01MF	J 50V
C508	24636229	Cap,Electrolytic	2. 2MF	M 50V
C509	24474102	Cap,Ceramic	1000PF	K 50V
C510	24474103	Cap,Ceramic	0. 01MF	N 50V
C511	24633100	Cap,Electrolytic	10MF	M 16V
C512	24635479	Cap,Electrolytic	4. 7MF	M 35V
C514	24633100	Cap,Electrolytic	10MF	M 16V
C515	24474103	Cap,Ceramic	0. 01MF	N 50V
C516	24474102	Cap,Ceramic	1000PF	K 50V
C517	24636478	Cap,Electrolytic	0. 47MF	M 50V
C518	24636010	Cap,Electrolytic	1MF	M 50V
C519	24474102	Cap,Ceramic	1000PF	K 50V
C520	24538823	Cap,Plastic	0. 082MF	J 50V
C521	24474103	Cap,Ceramic	0. 01MF	N 50V
C522	24436101	Cap,Ceramic	100PF	J 50V
C523	24796220	Cap,Electrolytic	22MF	M 35V
C524	24474102	Cap,Ceramic	1000PF	K 50V
C525	24474103	Cap,Ceramic	0. 01MF	N 50V
C528	24636478	Cap,Electrolytic	0. 47MF	M 50V
C529	24232223	Cap,Ceramic	0. 022MF	Z 50V
C530	24474103	Cap,Ceramic	0. 01MF	N 50V
C531	24633100	Cap,Electrolytic	10MF	M 16V
C532	24794470	Cap,Electrolytic	47MF	M 16V
C533	24474102	Cap,Ceramic	1000PF	K 50V
C534	24591103	Cap,Plastic	0. 01MF	J 50V
C535	24474103	Cap,Ceramic	0. 01MF	N 50V
C536	24474102	Cap,Ceramic	1000PF	K 50V
C537	24474102	Cap,Ceramic	1000PF	K 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C538	24212561	Cap,Ceramic	560PF	K 50V
C540	24474103	Cap,Ceramic	0. 01MF	N 50V
C541	24636229	Cap,Electrolytic	2. 2MF	M 50V
C545	24474103	Cap,Ceramic	0. 01MF	N 50V
C601	24793101	Cap,Electrolytic	100MF	M 10V
C602	24636010	Cap,Electrolytic	1MF	M 50V
C603	24794470	Cap,Electrolytic	47MF	M 16V
C604	24473470	Cap,Ceramic	47PF	J 50V
C605	24473470	Cap,Ceramic	47PF	J 50V
C608	24794470	Cap,Electrolytic	47MF	M 16V
C609	24636479	Cap,Electrolytic	4. 7MF	M 50V
C610	24794470	Cap,Electrolytic	47MF	M 16V
C611	24633100	Cap,Electrolytic	10MF	M 16V
C612	24474103	Cap,Ceramic	0. 01MF	N 50V
C613	24474103	Cap,Ceramic	0. 01MF	N 50V
C614	24474103	Cap,Ceramic	0. 01MF	N 50V
C615	24232223	Cap,Ceramic	0. 022MF	Z 50V
C620	24232223	Cap,Ceramic	0. 022MF	Z 50V
C621	24232223	Cap,Ceramic	0. 022MF	Z 50V
C622	24232223	Cap,Ceramic	0. 022MF	Z 50V
C623	24538104	Cap,Plastic	0. 1MF	J 50V
C631	24538474	Cap,Plastic	0. 47MF	J 50V
C632	24538474	Cap,Plastic	0. 47MF	J 50V
C701	24633100	Cap,Electrolytic	10MF	M 16V
C702	24794470	Cap,Electrolytic	47MF	M 16V
C703	24636010	Cap,Electrolytic	1MF	M 50V
C704	24591122	Cap,Plastic	1200PF	J 50V
C705	24591123	Cap,Plastic	0.012MF	J 50V
C706	24794470	Cap,Electrolytic	47MF	M 16V
C707	24633100	Cap,Electrolytic	10MF	M 16V
C708	24633100	Cap,Electrolytic	10MF	M 16V
C709	24633220	Cap,Electrolytic	22MF	M 16V
C710	24633100	Cap,Electrolytic	10MF	M 16V
C711	24633220	Cap,Electrolytic	22MF	M 16V
C712	24633100	Cap,Electrolytic	10MF	M 16V
C713	24591273	Cap,Plastic	0.027MF	J 50V
C714	24636010	Cap,Electrolytic	1MF	M 50V
C716	24794470	Cap,Electrolytic	47MF	M 16V
C717	24212472	Cap,Ceramic	4700PF	K 50V
C718	24591682	Cap,Plastic	6800PF	J 50V
C719	24538823	Cap,Plastic	0. 082MF	J 50V
C720	24214221	Cap,Ceramic	220PF	K 500V
C721	24212472	Cap,Ceramic	4700PF	K 50V
C727	24636010	Cap,Electrolytic	1MF	M 50V
RESISTORS				
R121	24366821	Res,Carbon	820	J 1/6W
R122	24366152	Res,Carbon	1. 5K	J 1/6W
R123	24366332	Res,Carbon	3. 3K	J 1/6W
R124	24366271	Res,Carbon	270	J 1/6W
R125	24366152	Res,Carbon	1. 5K	J 1/6W
R126	24366391	Res,Carbon	390	J 1/6W
R127	24366162	Res,Carbon	1. 6K	G 1/6W
R128	24366562	Res,Carbon	5. 6K	J 1/6W
R129	24366222	Res,Carbon	2. 2K	J 1/6W
R130	24366431	Res,Carbon	430	J 1/6W
R131	24366561	Res,Carbon	560	J 1/6W
R132	24366561	Res,Carbon	560	J 1/6W
R133	24366681	Res,Carbon	680	J 1/6W
R134	24366122	Res,Carbon	1. 2K	J 1/6W
R135	24366271	Res,Carbon	270	J 1/6W
R136	24366122	Res,Carbon	1. 2K	J 1/6W
R137	24366102	Res,Carbon	1K	J 1/6W
R138	24366151	Res,Carbon	150	J 1/6W
R139	24366102	Res,Carbon	1K	J 1/6W
R140	24366101	Res,Carbon	100	J 1/6W
R141	24366511	Res,Carbon	510	J 1/6W
R142	24366182	Res,Carbon	1. 8K	J 1/6W
R145	24366561	Res,Carbon	560	J 1/6W
R146	24366821	Res,Carbon	820	J 1/6W
R147	24366182	Res,Carbon	1. 8K	J 1/6W
R148	24366272	Res,Carbon	2. 7K	J 1/6W
R149	24366561	Res,Carbon	560	J 1/6W
R160	24366272	Res,Carbon	2. 7K	J 1/6W
R161	24366101	Res,Carbon	100	J 1/6W
R162	24366102	Res,Carbon	1K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R163	24366102	Res.Carbon	1K	J 1/6W
R164	24366332	Res.Carbon	3. 3K	J 1/6W
⚠R165	24531220	Res.Fusible	22	J 1/2W
R166	24366390	Res.Carbon	39	J 1/6W
R167	24366102	Res.Carbon	1K	J 1/6W
R168	24366223	Res.Carbon	22K	J 1/6W
R201	24367682	Res.Carbon	6. 8K	G 1/6W
R202	24367472	Res.Carbon	4. 7K	G 1/6W
R203	24366272	Res.Carbon	2. 7K	J 1/6W
R204	24366102	Res.Carbon	1K	J 1/6W
R205	24366302	Res.Carbon	3K	J 1/6W
R206	24366154	Res.Carbon	150K	J 1/6W
R207	24367102	Res.Carbon	1K	G 1/6W
R208	24366272	Res.Carbon	2. 7K	J 1/6W
R209	24367102	Res.Carbon	1K	G 1/6W
R210	24366623	Res.Carbon	62K	J 1/6W
R211	24366823	Res.Carbon	82K	J 1/6W
R212	24366621	Res.Carbon	620	J 1/6W
R213	24366274	Res.Carbon	270K	J 1/6W
R214	24366103	Res.Carbon	10K	J 1/6W
R215	24366103	Res.Carbon	10K	J 1/6W
R216	24366822	Res.Carbon	8. 2K	J 1/6W
R217	24367331	Res.Carbon	330	G 1/6W
R218	24366564	Res.Carbon	560K	J 1/6W
R219	24366474	Res.Carbon	470K	J 1/6W
R220	24366680	Res.Carbon	68	J 1/6W
R221	24366472	Res.Carbon	4. 7K	J 1/6W
R222	24366392	Res.Carbon	3. 9K	J 1/6W
R223	24366123	Res.Carbon	12K	J 1/6W
R224	24367911	Res.Carbon	910	G 1/6W
R225	24367102	Res.Carbon	1K	G 1/6W
R226	24366122	Res.Carbon	1. 2K	J 1/6W
R227	24366101	Res.Carbon	100	J 1/6W
R228	24366331	Res.Carbon	330	J 1/6W
R229	24366150	Res.Carbon	15	J 1/6W
R230	24366222	Res.Carbon	2. 2K	J 1/6W
R231	24366202	Res.Carbon	2K	J 1/6W
R232	24366183	Res.Carbon	18K	J 1/6W
R233	24366823	Res.Carbon	82K	J 1/6W
R234	24366222	Res.Carbon	2. 2K	J 1/6W
R236	24366562	Res.Carbon	5. 6K	J 1/6W
R237	24366222	Res.Carbon	2. 2K	J 1/6W
R238	24366102	Res.Carbon	1K	J 1/6W
R239	24366392	Res.Carbon	3. 9K	J 1/6W
R240	24366821	Res.Carbon	820	J 1/6W
R241	24366332	Res.Carbon	3. 3K	J 1/6W
R242	24366682	Res.Carbon	6. 8K	J 1/6W
R243	24366103	Res.Carbon	10K	J 1/6W
R244	24366222	Res.Carbon	2. 2K	J 1/6W
R245	24366563	Res.Carbon	56K	J 1/6W
R246	24366472	Res.Carbon	4. 7K	J 1/6W
R247	24366823	Res.Carbon	82K	J 1/6W
R248	24366273	Res.Carbon	27K	J 1/6W
R249	24366472	Res.Carbon	4. 7K	J 1/6W
R251	24066952	Res.Variable	10K	
R252	24066952	Res.Variable	10K	
R253	24066952	Res.Variable	10K	
R254	24066953	Res.Variable	100K	
R256	24066953	Res.Variable	100K	
R259	24066954	Res.Variable	2K	
R260	24366683	Res.Carbon	68K	J 1/6W
R261	24366103	Res.Carbon	10K	J 1/6W
R262	24366393	Res.Carbon	39K	J 1/6W
R263	24366103	Res.Carbon	10K	J 1/6W
R264	24366103	Res.Carbon	10K	J 1/6W
R265	24366472	Res.Carbon	4. 7K	J 1/6W
R266	24366103	Res.Carbon	10K	J 1/6W
R267	24366102	Res.Carbon	1K	J 1/6W
R268	24366302	Res.Carbon	3K	J 1/6W
R269	24366471	Res.Carbon	470	J 1/6W
R270	24366823	Res.Carbon	82K	J 1/6W
R271	24366332	Res.Carbon	3. 3K	J 1/6W
R272	24366562	Res.Carbon	5. 6K	J 1/6W
R273	24366152	Res.Carbon	1. 5K	J 1/6W
R274	24366911	Res.Carbon	910	G 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R275	24366432	Res.Carbon	4. 3K	J 1/6W
R276	24366221	Res.Carbon	220	J 1/6W
R277	24366155	Res.Carbon	1.5M	G 1/6W
R278	24366474	Res.Carbon	470K	J 1/6W
R279	24366681	Res.Carbon	680	J 1/6W
R280	24366112	Res.Carbon	1. 1K	J 1/6W
R281	24366112	Res.Carbon	1. 1K	J 1/6W
R282	24367911	Res.Carbon	910	G 1/6W
R283	24367162	Res.Carbon	1. 6K	G 1/6W
R284	24366821	Res.Carbon	820	J 1/6W
R285	24366112	Res.Carbon	1. 1K	J 1/6W
R286	24366683	Res.Carbon	68K	J 1/6W
R289	24366513	Res.Carbon	51K	J 1/6W
R290	24366333	Res.Carbon	33K	J 1/6W
R291	24366122	Res.Carbon	1. 2K	J 1/6W
R292	24366102	Res.Carbon	1K	J 1/6W
R293	24366271	Res.Carbon	270	J 1/6W
R294	24366105	Res.Carbon	1M	J 1/6W
R401	24366183	Res.Carbon	18K	J 1/6W
R402	24366472	Res.Carbon	4. 7K	J 1/6W
R403	24366102	Res.Carbon	1K	J 1/6W
R404	24366102	Res.Carbon	1K	J 1/6W
R405	24366471	Res.Carbon	470	J 1/6W
R406	24366470	Res.Carbon	47	J 1/6W
R407	24366183	Res.Carbon	18K	J 1/6W
R408	24366822	Res.Carbon	8. 2K	J 1/6W
R409	24366222	Res.Carbon	2. 2K	J 1/6W
R410	24366471	Res.Carbon	470	J 1/6W
R411	24366102	Res.Carbon	1K	J 1/6W
R412	24366471	Res.Carbon	470	J 1/6W
R413	24366183	Res.Carbon	18K	J 1/6W
R414	24366822	Res.Carbon	8. 2K	J 1/6W
R415	24366102	Res.Carbon	1K	J 1/6W
R416	24366561	Res.Carbon	560	J 1/6W
R417	24366102	Res.Carbon	1K	J 1/6W
R418	24366182	Res.Carbon	1. 8K	J 1/6W
R420	24366271	Res.Carbon	270	J 1/6W
R421	24366122	Res.Carbon	1. 2K	J 1/6W
R422	24366333	Res.Carbon	33K	J 1/6W
R423	24366273	Res.Carbon	27K	J 1/6W
R424	24366821	Res.Carbon	820	J 1/6W
R425	24366104	Res.Carbon	100K	J 1/6W
R426	24366102	Res.Carbon	1K	J 1/6W
R427	24366105	Res.Carbon	1M	J 1/6W
R428	24366682	Res.Carbon	6. 8K	J 1/6W
R429	24366562	Res.Carbon	5. 6K	J 1/6W
R430	24366822	Res.Carbon	8. 2K	J 1/6W
R431	24366183	Res.Carbon	18K	J 1/6W
R432	24366222	Res.Carbon	2. 2K	J 1/6W
R433	24366822	Res.Carbon	8. 2K	J 1/6W
R434	24366102	Res.Carbon	1K	J 1/6W
R435	24366822	Res.Carbon	8. 2K	J 1/6W
R436	24366682	Res.Carbon	6. 8K	J 1/6W
R437	24366102	Res.Carbon	1K	J 1/6W
R438	24366102	Res.Carbon	1K	J 1/6W
R439	24366470	Res.Carbon	47	J 1/6W
R440	24366272	Res.Carbon	2. 7K	J 1/6W
R441	24366223	Res.Carbon	22K	J 1/6W
R442	24366333	Res.Carbon	33K	J 1/6W
R443	24366472	Res.Carbon	4. 7K	J 1/6W
R444	24366222	Res.Carbon	2. 2K	J 1/6W
R445	24366470	Res.Carbon	47	J 1/6W
R446	24366273	Res.Carbon	27K	J 1/6W
R447	24366223	Res.Carbon	22K	J 1/6W
R448	24366333	Res.Carbon	33K	J 1/6W
R449	24366103	Res.Carbon	10K	J 1/6W
R451	24066955	Res.Variable	1K	
R453	24066951	Res.Variable	20K	
R461	24366273	Res.Carbon	27K	J 1/6W
R462	24366102	Res.Carbon	1K	J 1/6W
R463	24366562	Res.Carbon	5. 6K	J 1/6W
R464	24366123	Res.Carbon	12K	J 1/6W
R465	24366104	Res.Carbon	100K	J 1/6W
R466	24366104	Res.Carbon	100K	J 1/6W
R467	24366181	Res.Carbon	180	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
POWER 1 BOARD (V-81/83W)				
U802	70194937	P C Board Assy,POWER 1		
TRANSISTORS				
Q801	A6841900	Transistor	2SD549	
DIODES				
⚠D801	23118977	Diode	ERC01-02FL	
⚠D802	23118977	Diode	ERC01-02FL	
⚠D803	A7568521	Diode	1S1885FA	
⚠D804	A7568521	Diode	1S1885FA	
⚠D805	A7568521	Diode	1S1885FA	
⚠D806	A7568521	Diode	1S1885FA	
D807	23118976	Diode	ERA12-02	
D808	23118976	Diode	ERA12-02	
CAPACITORS				
⚠C801	24095831	Cap,Plastic	0. 1MF	M 250V
C803	24232103	Cap,Ceramic	0. 01MF	Z 50V
C804	24232103	Cap,Ceramic	0. 01MF	Z 50V
⚠C805	24796222	Cap,Electrolytic	2200MF	M 35V
⚠C806	24796222	Cap,Electrolytic	2200MF	M 35V
⚠C807	24794332	Cap,Electrolytic	3300MF	M 16V
C808	24798470	Cap,Electrolytic	47MF	M 100V
C809	24798470	Cap,Electrolytic	47MF	M 100V
C810	24636100	Cap,Electrolytic	10MF	M 50V
C813	24634220	Cap,Electrolytic	22MF	M 25V
RESISTORS				
⚠R801	24531220	Res,Fusible	22	J 1/2W
R803	24366473	Res,Carbon	47K	J 1/6W
R804	24366472	Res,Carbon	4. 7K	J 1/6W
R805	24366222	Res,Carbon	2. 2K	J 1/6W
R851	24066985	Res,Variable	1K	
MISCELLANEOUS				
⚠F801	23144129	Fuse,2A		
⚠F802	23144959	Fuse,3.15A		
⚠F803	23144164	Fuse,250V,1.25A		
⚠F801A	23165102	Fuse Holder		
⚠F802A	23165102	Fuse Holder		
⚠F803A	23165102	Fuse Holder		
⚠T801	23211997	Linefilter	TRE3004C	
POWER 2 BOARD (V-81/83W)				
U803	70194938	P C Board Assy,POWER 2		
TRANSISTORS				
Q802	A6868450	Transistor	2SD1415	
Q803	A6332430	Transistor	2SC2458-Y	
Q804	A6868450	Transistor	2SD1415	
Q805	A6332430	Transistor	2SC2458-Y	
Q806	A6868020	Transistor	2SD1406-Y	
Q807	A6325825	Transistor	2SC2240GR	
Q808	A6002020	Transistor	RN1202	
Q809	A6533625	Transistor	2SA970GR	
Q810	A6002010	Transistor	RN1201	
DIODES				
D809	A7110115	Diode,Zener	05Z 6. 8Y	
D810	A7110635	Diode,Zener	05Z 20Z	
D814	A7160570	Diode	1SS176	
D815	A7110017	Diode,Zener	05Z 5. 6Y	
D816	A7160570	Diode	1SS176	
D817	A7110412	Diode,Zener	05Z12Z	
D818	A7160570	Diode	1SS176	
D819	A7110016	Diode,Zener	05Z 5. 6X	
D820	A7160570	Diode	1SS176	
D821	A7160570	Diode	1SS176	
D822	A7160570	Diode	1SS176	
CAPACITORS				
C811	24634220	Cap,Electrolytic	22MF	M 25V
C812	24591103	Cap,Plastic	0. 01MF	J 50V
C814	24634220	Cap,Electrolytic	22MF	M 25V
C815	24634100	Cap,Electrolytic	10MF	M 25V
C817	24798479	Cap,Electrolytic	4.7MF	M 100V
C818	24636229	Cap,Electrolytic	2. 2MF	M 50V
C822	24591103	Cap,Plastic	0. 01MF	J 50V
RESISTORS				
R802	24383222	Res,Oxide	2. 2K	J 2W
R811	24366163	Res,Carbon	16K	J 1/6W
R812	24366122	Res,Carbon	1. 2K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R813	24366152	Res,Carbon	1. 5K	J 1/6W
R814	24366162	Res,Carbon	1. 6K	G 1/6W
R815	24366222	Res,Carbon	2. 2K	J 1/6W
⚠R816	24531100	Res,Fusible	10	J 1/2W
R817	24552751	Res,Oxide Metal	750	J 1/2W
R818	24366153	Res,Carbon	15K	J 1/6W
R819	24366123	Res,Carbon	12K	J 1/6W
R820	24366362	Res,Carbon	3. 6K	J 1/6W
R822	24552103	Res,Oxide Metal	10K	J 1/2W
R824	24366822	Res,Carbon	8. 2K	J 1/6W
R825	24366123	Res,Carbon	12K	J 1/6W
R826	24366103	Res,Carbon	10K	J 1/6W
R827	24366223	Res,Carbon	22K	J 1/6W
R828	24366103	Res,Carbon	10K	J 1/6W
R829	24366103	Res,Carbon	10K	J 1/6W
CAM SWITCH BOARD				
UM06	70197081	P C Board Assy,Cam SW		
MISCELLANEOUS				
SM61	23145424	Cam Switch		
PRE AMP BOARD (V-81/83W)				
U101	70197092	P C Board Assy,PRE AMP,V-81W		
U101	70194936	P C Board Assy,PRE AMP,V-83W		
INTEGRATED CIRCUITS				
IC101	B0358220	IC	TA7772P	
TRANSISTORS				
Q102	A6332430	Transistor	2SC2458-Y	
DIODES				
D101	A7160570	Diode	1SS176	
D102	A7160570	Diode	1SS176	
COILS				
L101	23239835	Coil,Peaking	TRF4109AJ	
L102	23239835	Coil,Peaking	TRF4109AJ	
L103	23238718	Coil,Peaking	TRF4479AJ	
L104	23238710	Coil,Peaking	TRF4220AJ	
CAPACITORS				
C101	24436120	Cap,Ceramic	12PF	J 50V
C102	24436430	Cap,Ceramic	43PF	J 50V
C103	24474103	Cap,Ceramic	0. 01MF	N 50V
C104	24474103	Cap,Ceramic	0. 01MF	N 50V
C105	24202330	Cap,Electrolytic	33MF	M 10V
C106	24474103	Cap,Ceramic	0. 01MF	N 50V
C107	24201470	Cap,Electrolytic	47MF	M 6.3V
C108	24206010	Cap,Electrolytic	1MF	M 50V
C109	24202330	Cap,Electrolytic	33MF	M 10V
C110	24474103	Cap,Ceramic	0. 01MF	N 50V
C111	24206010	Cap,Electrolytic	1MF	M 50V
RESISTORS				
R101	24366821	Res,Carbon	820	J 1/6W
R102	24366821	Res,Carbon	820	J 1/6W
R103	24366361	Res,Carbon	360	J 1/6W
R104	24366331	Res,Carbon	330	J 1/6W
R105	24366102	Res,Carbon	1K	J 1/6W
R106	24366102	Res,Carbon	1K	J 1/6W
R107	24366272	Res,Carbon	2. 7K	J 1/6W
R108	24366152	Res,Carbon	1. 5K	J 1/6W
R109	24366272	Res,Carbon	2. 7K	J 1/6W
R110	24366152	Res,Carbon	1. 5K	J 1/6W
R111	24366103	Res,Carbon	10K	J 1/6W
R112	24366471	Res,Carbon	470	J 1/6W
PRE AMP BOARD (V-81/83G)				
U101	70197041	P C Board Assy,PRE AMP,V-81G		
U101	70194968	P C Board Assy,PRE AMP,V-83G		
INTEGRATED CIRCUITS				
IC101	B0358220	IC	TA7772P	
TRANSISTORS				
Q102	A6332430	Transistor	2SC2458-Y	
DIODES				
D101	A7160570	Diode	1SS176	
D102	A7160570	Diode	1SS176	
COILS				
L103	23238718	Coil,Peaking	TRF4479AJ	
L104	23238710	Coil,Peaking	TRF4220AJ	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CAPACITORS				
C101	24436120	Cap.Ceramic	12PF	J 50V
C102	24436430	Cap.Ceramic	43PF	J 50V
C103	24474103	Cap.Ceramic	0. 01MF	N 50V
C104	24474103	Cap.Ceramic	0. 01MF	N 50V
C105	24202330	Cap.Electrolytic	33MF	M 10V
C106	24474103	Cap.Ceramic	0. 01MF	N 50V
C107	24201470	Cap.Electrolytic	47MF	M 6.3V
C108	24206010	Cap.Electrolytic	1MF	M 50V
C109	24202330	Cap.Electrolytic	33MF	M 10V
C110	24474103	Cap.Ceramic	0. 01MF	N 50V
C111	24206010	Cap.Electrolytic	1MF	M 50V
RESISTORS				
R103	24366361	Res.Carbon	360	J 1/6W
R104	24366331	Res.Carbon	330	J 1/6W
R105	24366102	Res.Carbon	1K	J 1/6W
R106	24366102	Res.Carbon	1K	J 1/6W
R107	24366272	Res.Carbon	2. 7K	J 1/6W
R108	24366152	Res.Carbon	1. 5K	J 1/6W
R109	24366272	Res.Carbon	2. 7K	J 1/6W
R110	24366152	Res.Carbon	1. 5K	J 1/6W
R111	24366103	Res.Carbon	10K	J 1/6W
R112	24366471	Res.Carbon	470	J 1/6W

SELECTOR BOARD (V-81/83G)

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
UA01	70197040	P C Board Assy,SELECTOR,V-81G		
UA01	70194963	P C Board Assy,SELECTOR,V-83G		
INTEGRATED CIRCUITS				
ICA01	70119579	IC	M50430-085SP	
ICA02	70119517	IC	M58659P	
ICL10	70119413	IC	PST520C	
TRANSISTORS				
QA03	A6332430	Transistor	2SC2458-Y	
QA04	A6012020	Transistor	RN2202	
QA05	A6002040	Transistor	RN1204	
QA06	A6332430	Transistor	2SC2458-Y	
QA07	A6332430	Transistor	2SC2458-Y	
QL11	A6533240	Transistor	2SA966-Y	
QL12	A6002060	Transistor	RN1206	
DIODES				
DA01	23115922	Diode,Zener	UPC574J	
DA02	A8600606	Diode,LED	TLR113AD-FA	
DA03	A7160590	Diode	1SS177	
DA04	A7160590	Diode	1SS177	
DL10	A7110017	Diode,Zener	05Z 5. 6Y	
DL11	A7110725	Diode,Zener	05Z30Y	
DL12	A7160590	Diode	1SS177	
DL13	A7160590	Diode	1SS177	
CAPACITORS				
CA01	24636100	Cap.Electrolytic	10MF	M 50V
CA02	24474151	Cap.Ceramic	150PF	K 50V
CA03	24538104	Cap.Plastic	0. 1MF	J 50V
CA04	24538104	Cap.Plastic	0. 1MF	J 50V
CA05	24538104	Cap.Plastic	0. 1MF	J 50V
CA06	24591473	Cap.Plastic	0. 047MF	J 50V
CA07	24794470	Cap.Electrolytic	47MF	M 16V
CA08	24473470	Cap.Ceramic	47PF	J 50V
CA09	24473470	Cap.Ceramic	47PF	J 50V
CA10	24636100	Cap.Electrolytic	10MF	M 50V
CA11	24636229	Cap.Electrolytic	2. 2MF	M 50V
CL10	24793222	Cap.Electrolytic	2200MF	M 10V
CL11	24635101	Cap.Electrolytic	100MF	M 35V
CL12	24636010	Cap.Electrolytic	1MF	M 50V
RESISTORS				
RA01	24366303	Res.Carbon	30K	J 1/6W
RA02	24366103	Res.Carbon	10K	J 1/6W
RA03	24366333	Res.Carbon	33K	J 1/6W
RA04	24366153	Res.Carbon	15K	J 1/6W
RA05	24366103	Res.Carbon	10K	J 1/6W
RA06	24366153	Res.Carbon	15K	J 1/6W
RA07	24366203	Res.Carbon	20K	J 1/6W
RA08	24366203	Res.Carbon	20K	J 1/6W
RA09	24366203	Res.Carbon	20K	J 1/6W
RA10	24366203	Res.Carbon	20K	J 1/6W
RA11	24366472	Res.Carbon	4. 7K	J 1/6W
RA12	24366472	Res.Carbon	4. 7K	J 1/6W
RA13	24366472	Res.Carbon	4. 7K	J 1/6W
RA16	24366271	Res.Carbon	270	J 1/6W
RA17	24366433	Res.Carbon	43K	J 1/6W
RA18	24366153	Res.Carbon	15K	J 1/6W
RA19	24366101	Res.Carbon	100	J 1/6W
RA20	24366102	Res.Carbon	1K	J 1/6W
RA21	24366102	Res.Carbon	1K	J 1/6W
RA22	24366471	Res.Carbon	470	J 1/6W
RA23	24366471	Res.Carbon	470	J 1/6W
RA24	24366103	Res.Carbon	10K	J 1/6W
RA25	24366103	Res.Carbon	10K	J 1/6W
RA26	24366103	Res.Carbon	10K	J 1/6W
RL10	24366301	Res.Carbon	300	J 1/6W
RL11	24366301	Res.Carbon	300	J 1/6W
RL12	24366473	Res.Carbon	47K	J 1/6W
RL13	24366391	Res.Carbon	390	J 1/6W
RL14	24366152	Res.Carbon	1. 5K	J 1/6W
RL15	24366103	Res.Carbon	10K	J 1/6W
RL16	24552391	Res.Oxide Metal	390	J 1/2W
RL17	24383302	Res.Oxide Metal	3K	J 2W
RL18	24383332	Res.Oxide Metal	3.3K	J 2W
RL19	24366472	Res.Carbon	4. 7K	J 1/6W
MISCELLANEOUS				
SA01	23145509	Push Switch,1C1P		
SA02	23145509	Push Switch,1C1P		
SA03	23145509	Push Switch,1C1P		
SA04	23145509	Push Switch,1C1P		
SA05	23145509	Push Switch,1C1P		
SA06	23145509	Push Switch,1C1P		
ZA01	23153949	Ceramic Resonator TCR1003,4MHz		

SELECTOR BOARD (V-81/83W)

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
UA01	70197091	P C Board Assy,SELECTOR,V-81W		
UA01	70194934	P C Board Assy,SELECTOR,V-83W		
INTEGRATED CIRCUITS				
ICA01	70119516	IC	M50430081SP	
ICA02	70119517	IC	M58659P	
ICL10	70119413	IC	PST520C	
TRANSISTORS				
QA03	A6332430	Transistor	2SC2458-Y	
QA04	A6012020	Transistor	RN2202	
QA05	A6002040	Transistor	RN1204	
QA06	A6332430	Transistor	2SC2458-Y	
QA07	A6332430	Transistor	2SC2458-Y	
QL11	A6533240	Transistor	2SA966-Y	
QL12	A6002060	Transistor	RN1206	
DIODES				
DA01	23115922	Diode,Zener	UPC574J	
DA02	A8600606	Diode,LED	TLR113AD-FA	
DA03	A7160590	Diode	1SS177	
DA04	A7160590	Diode	1SS177	
DL10	A7110017	Diode,Zener	05Z 5. 6Y	
DL11	A7110725	Diode,Zener	05Z30Y	
DL12	A7160590	Diode	1SS177	
DL13	A7160590	Diode	1SS177	
CAPACITORS				
CA01	24636100	Cap.Electrolytic	10MF	M 50V
CA02	24474151	Cap.Ceramic	150PF	K 50V
CA03	24538104	Cap.Plastic	0. 1MF	J 50V
CA04	24538104	Cap.Plastic	0. 1MF	J 50V
CA05	24538104	Cap.Plastic	0. 1MF	J 50V
CA06	24591473	Cap.Plastic	0. 047MF	J 50V
CA07	24794470	Cap.Electrolytic	47MF	M 16V
CA08	24473470	Cap.Ceramic	47PF	J 50V
CA09	24473470	Cap.Ceramic	47PF	J 50V
CA10	24636100	Cap.Electrolytic	10MF	M 50V
CA11	24636229	Cap.Electrolytic	2. 2MF	M 50V
CL10	24793222	Cap.Electrolytic	2200MF	M 10V
CL11	24635101	Cap.Electrolytic	100MF	M 35V
CL12	24636010	Cap.Electrolytic	1MF	M 50V
RESISTORS				
RA01	24366303	Res.Carbon	30K	J 1/6W
RA02	24366103	Res.Carbon	10K	J 1/6W
RA03	24366333	Res.Carbon	33K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RA04	24366153	Res,Carbon	15K	J 1/6W
RA05	24366103	Res,Carbon	10K	J 1/6W
RA06	24366153	Res,Carbon	15K	J 1/6W
RA07	24366203	Res,Carbon	20K	J 1/6W
RA08	24366203	Res,Carbon	20K	J 1/6W
RA09	24366203	Res,Carbon	20K	J 1/6W
RA10	24366203	Res,Carbon	20K	J 1/6W
RA11	24366472	Res,Carbon	4. 7K	J 1/6W
RA16	24366271	Res,Carbon	270	J 1/6W
RA17	24366433	Res,Carbon	43K	J 1/6W
RA18	24366153	Res,Carbon	15K	J 1/6W
RA19	24366101	Res,Carbon	100	J 1/6W
RA20	24366102	Res,Carbon	1K	J 1/6W
RA21	24366102	Res,Carbon	1K	J 1/6W
RA24	24366103	Res,Carbon	10K	J 1/6W
RA25	24366103	Res,Carbon	10K	J 1/6W
RA26	24366103	Res,Carbon	10K	J 1/6W
RL10	24366301	Res,Carbon	300	J 1/6W
RL11	24366301	Res,Carbon	300	J 1/6W
RL12	24366473	Res,Carbon	47K	J 1/6W
RL13	24366391	Res,Carbon	390	J 1/6W
RL14	24366152	Res,Carbon	1. 5K	J 1/6W
RL15	24366103	Res,Carbon	10K	J 1/6W
RL16	24552391	Res,Oxide Metal	390	J 1/2W
RL17	24383302	Res,Oxide Metal	3K	J 2W
RL18	24383332	Res,Oxide Metal	3.3K	J 2W
RL19	24366472	Res,Carbon	4. 7K	J 1/6W
MISCELLANEOUS				
SA01	23145509	Push Switch,1C1P		
SA02	23145509	Push Switch,1C1P		
SA03	23145509	Push Switch,1C1P		
SA04	23145509	Push Switch,1C1P		
SA05	23145509	Push Switch,1C1P		
SA06	23145509	Push Switch,1C1P		
ZA01	23153949	Ceramic Resonator TCR1003.4MHz		
LOGIC CTL BOARD (V-81G/W)				
UL01	70197039	P C Board Assy,LOGIC CTL,V-81G		
UL01	70197090	P C Board Assy,LOGIC CTL,V-81W		
DIODES				
DL05	A8690640	Diode,LED	TLUG163	
DL07	A8690640	Diode,LED	TLUG163	
DX16	A7160590	Diode	1SS177	
DX17	A7160590	Diode	1SS177	
DX18	A8690640	Diode,LED	TLUG163	
RESISTORS				
RX09	24366271	Res,Carbon	270	J 1/6W
MISCELLANEOUS				
SL03	23145509	Push Switch,1C1P		
SL04	23145509	Push Switch,1C1P		
SL05	23145509	Push Switch,1C1P		
SL06	23145509	Push Switch,1C1P		
SL07	23145509	Push Switch,1C1P		
SL08	23145509	Push Switch,1C1P		
SL09	23145509	Push Switch,1C1P		
SX19	23145509	Push Switch,1C1P		
LOGIC CTL BOARD (V-83G/W)				
UL01	70194964	P C Board Assy,LOGIC CTL,V-83G		
UL01	70194935	P C Board Assy,LOGIC CTL,V-83W		
DIODES				
DX15	A7160590	Diode	1SS177	
DX16	A7160590	Diode	1SS177	
DX17	A7160590	Diode	1SS177	
DX18	A8605671	Diode,LED	TLG113A(FA)	
RESISTORS				
RX09	24366271	Res,Carbon	270	J 1/6W
MISCELLANEOUS				
SL02	23145510	Push Switch,1C1P		
SL03	23145510	Push Switch,1C1P		
SL04	23145510	Push Switch,1C1P		
SL05	23145510	Push Switch,1C1P		
SL06	23145510	Push Switch,1C1P		
SL07	23145510	Push Switch,1C1P		
SL08	23145510	Push Switch,1C1P		

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
SL09	23145510	Push Switch,1C1P		
SX19	23145510	Push Switch,1C1P		
TIMER BOARD (V-83G/W)				
UX02	70194962	P C Board Assy,TIMER,V-83G		
UX02	70194933	P C Board Assy,TIMER,V-83W		
INTEGRATED CIRCUITS				
ICR01	23119566	IC	UPC1474HA	
ICX01	70119578	IC	TMP47C410AN6775Z	
TRANSISTORS				
QX02	A6332430	Transistor	2SC2458-Y	
QX04	A6002010	Transistor	RN1201	
DIODES				
DL02	A8600606	Diode,LED	TLR113AD-FA	
DL05	A8605671	Diode,LED	TLG113A(FA)	
DL07	A8605671	Diode,LED	TLG113A(FA)	
DR01	23115800	Diode,Photo	PH-302	
DX01	A7160590	Diode	1SS177	
DX02	A7160590	Diode	1SS177	
DX03	A7160590	Diode	1SS177	
DX04	A7160590	Diode	1SS177	
DX07	A7160590	Diode	1SS177	
DX09	A7160590	Diode	1SS177	
DX12	A7160590	Diode	1SS177	
DX13	A7160590	Diode	1SS177	
DX14	A7160590	Diode	1SS177	
DX27	A7152800	Diode	1SS227	
DX28	A7152800	Diode	1SS227	
DX29	A7160570	Diode	1SS176	
COILS				
LR01	23238722	Coil,Peaking	TRF4822AI	
CAPACITORS				
CR01	24202330	Cap,Electrolytic	33MF	M 10V
CR02	24203100	Cap,Electrolytic	10MF	M 16V
CR03	24203100	Cap,Electrolytic	10MF	M 16V
CR04	24593222	Cap,Plastic	2200PF	J 50V
CR05	24538683	Cap,Plastic	0. 068MF	J 50V
CR06	24501222	Cap,Plastic	2200PF	J 50V
CR07	24202470	Cap,Electrolytic	47MF	M 10V
CX01	24793101	Cap,Electrolytic	100MF	M 10V
CX02	24473470	Cap,Ceramic	47PF	J 50V
CX03	24473470	Cap,Ceramic	47PF	J 50V
CX04	24474103	Cap,Ceramic	0. 01MF	N 50V
CX05	24474103	Cap,Ceramic	0. 01MF	N 50V
CX07	24474103	Cap,Ceramic	0. 01MF	N 50V
CX08	24474103	Cap,Ceramic	0. 01MF	N 50V
CX10	24591102	Cap,Plastic	1000PF	J 50V
RESISTORS				
R258	24069645	Res,Variable	10K	
R556	24069640	Res,Variable	500K	
RR01	24366222	Res,Carbon	2. 2K	J 1/6W
RR02	24366100	Res,Carbon	10	J 1/6W
RR03	24366103	Res,Carbon	10K	J 1/6W
RR04	24366223	Res,Carbon	22K	J 1/6W
RX01	24366473	Res,Carbon	47K	J 1/6W
RX02	24366223	Res,Carbon	22K	J 1/6W
RX04	24366123	Res,Carbon	12K	J 1/6W
RX05	24366123	Res,Carbon	12K	J 1/6W
RX06	24366123	Res,Carbon	12K	J 1/6W
RX07	24366123	Res,Carbon	12K	J 1/6W
RX08	24366123	Res,Carbon	12K	J 1/6W
RX10	24366222	Res,Carbon	2. 2K	J 1/6W
RX11	24366223	Res,Carbon	22K	J 1/6W
RX12	24366223	Res,Carbon	22K	J 1/6W
RX13	24366223	Res,Carbon	22K	J 1/6W
RX14	24366223	Res,Carbon	22K	J 1/6W
RX15	24366223	Res,Carbon	22K	J 1/6W
RX16	24366223	Res,Carbon	22K	J 1/6W
RX25	24366102	Res,Carbon	1K	J 1/6W
RX30	24366221	Res,Carbon	220	J 1/6W
RX31	24366221	Res,Carbon	220	J 1/6W
RX32	24366221	Res,Carbon	220	J 1/6W
RX33	24366511	Res,Carbon	510	J 1/6W
RX34	24366511	Res,Carbon	510	J 1/6W
MISCELLANEOUS				

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
GX01	70113090	FIP8BLM7,V-83G		
GX01	70113087	FIP8YM7,V-83W		
GX01A	70862480	FIP Holder		
SX01	23145510	Push Switch,1C1P		
SX02	23145510	Push Switch,1C1P		
SX03	23145510	Push Switch,1C1P		
SX04	23145510	Push Switch,1C1P		
SX07	23145510	Push Switch,1C1P		
SX08	23145510	Push Switch,1C1P		
SX09	23145510	Push Switch,1C1P		
SX10	23145510	Push Switch,1C1P		
SX11	23145510	Push Switch,1C1P		
SX12	23145510	Push Switch,1C1P		
SX13	23145510	Push Switch,1C1P		
SX14	23145532	Slide Switch,2C3P		
SX15	23145510	Push Switch,1C1P		
SX16	23145510	Push Switch,1C1P		
SX17	23145510	Push Switch,1C1P		
SX18	23145510	Push Switch,1C1P		
TR01	23232963	Coil,Variable	TRF3055	
XX01	23153847	Resonator,4MHz,TCR1014		
ZX01	24000708	Resistor Block,100Kx9		
ZX02	24000713	Resistor Block,100Kx4		
ZX03	24000713	Resistor Block,100Kx4		
	TIMER BOARD (V-81G/W)			
UX02	70197038	P C Board Assy,TIMER,V-81G		
UX02	70197089	P C Board Assy,TIMER,V-81W		
INTEGRATED CIRCUITS				
ICR01	23119566	IC	UPC1474HA	
ICX01	70119578	IC	TMP47C410AN6775Z	
TRANSISTORS				
QX02	A6332430	Transistor	2SC2458-Y	
QX04	A6002010	Transistor	RN1201	
DIODES				
DL02	A8690540	Diode,LED	TLUR163	
DR01	23115800	Diode,Photo	PH-302	
DX01	A7160590	Diode	1SS177	
DX02	A7160590	Diode	1SS177	
DX03	A7160590	Diode	1SS177	
DX04	A7160590	Diode	1SS177	
DX07	A7160590	Diode	1SS177	
DX09	A7160590	Diode	1SS177	
DX12	A7160590	Diode	1SS177	
DX13	A7160590	Diode	1SS177	
DX14	A7160590	Diode	1SS177	
DX15	A7160590	Diode	1SS177	
COILS				
LR01	23238722	Coil,Peaking	TRF4822AI	
CAPACITORS				
CR01	24202330	Cap,Electrolytic	33MF	M 10V
CR02	24203100	Cap,Electrolytic	10MF	M 16V
CR03	24203100	Cap,Electrolytic	10MF	M 16V
CR04	24593222	Cap,Plastic	2200PF	J 50V
CR05	24538683	Cap,Plastic	0. 068MF	J 50V
CR06	24501222	Cap,Plastic	2200PF	J 50V
CR07	24202470	Cap,Electrolytic	47MF	M 10V
CX01	24793101	Cap,Electrolytic	100MF	M 10V
CX02	24473470	Cap,Ceramic	47PF	J 50V
CX03	24473470	Cap,Ceramic	47PF	J 50V
CX04	24474103	Cap,Ceramic	0. 01MF	N 50V
CX05	24474103	Cap,Ceramic	0. 01MF	N 50V
CX07	24474103	Cap,Ceramic	0. 01MF	N 50V
CX08	24474103	Cap,Ceramic	0. 01MF	N 50V
RESISTORS				
R258	24069658	Res,Variable	10K	
R556	24069653	Res,Variable	500K	
RR01	24366222	Res,Carbon	2. 2K	J 1/6W
RR02	24366100	Res,Carbon	10	J 1/6W
RR03	24366103	Res,Carbon	10K	J 1/6W
RR04	24366223	Res,Carbon	22K	J 1/6W
RX01	24366473	Res,Carbon	47K	J 1/6W
RX02	24366223	Res,Carbon	22K	J 1/6W
RX04	24366123	Res,Carbon	12K	J 1/6W
RX05	24366123	Res,Carbon	12K	J 1/6W
RX06	24366123	Res,Carbon	12K	J 1/6W
RX07	24366123	Res,Carbon	12K	J 1/6W
RX08	24366123	Res,Carbon	12K	J 1/6W
RX10	24366222	Res,Carbon	2. 2K	J 1/6W
RX11	24366223	Res,Carbon	22K	J 1/6W
RX12	24366223	Res,Carbon	22K	J 1/6W
RX13	24366223	Res,Carbon	22K	J 1/6W
RX14	24366223	Res,Carbon	22K	J 1/6W
RX15	24366223	Res,Carbon	22K	J 1/6W
RX16	24366223	Res,Carbon	22K	J 1/6W
RX25	24366102	Res,Carbon	1K	J 1/6W
RX30	24366221	Res,Carbon	220	J 1/6W
RX31	24366221	Res,Carbon	220	J 1/6W
RX32	24366221	Res,Carbon	220	J 1/6W
MISCELLANEOUS				
GX01	70113090	FIP8BLM7,V-81G		
GX01	70113087	FIP8YM7,V-81W		
GX01A	70862480	FIP Holder		
SL02	23145509	Push Switch,1C1P		
SX01	23145510	Push Switch,1C1P		
SX02	23145510	Push Switch,1C1P		
SX03	23145510	Push Switch,1C1P		
SX04	23145510	Push Switch,1C1P		
SX07	23145510	Push Switch,1C1P		
SX08	23145510	Push Switch,1C1P		
SX09	23145510	Push Switch,1C1P		
SX10	23145510	Push Switch,1C1P		
SX11	23145510	Push Switch,1C1P		
SX12	23145510	Push Switch,1C1P		
SX13	23145510	Push Switch,1C1P		
SX14	23145532	Slide Switch,2C3P		
SX15	23145510	Push Switch,1C1P		
SX16	23145510	Push Switch,1C1P		
SX17	23145510	Push Switch,1C1P		
SX18	23145510	Push Switch,1C1P		
TR01	23232963	Coil,Variable	TRF3055	
XX01	23153847	Resonator,4MHz,TCR1014		
ZX01	24000708	Resistor Block,100Kx9		
ZX02	24000713	Resistor Block,100Kx4		
ZX03	24000713	Resistor Block,100Kx4		

SECTION 4

PARTS LIST

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SAFETY PRECAUTION

The parts identified by ⚠ mark are critical for safety. Replace only with part number specified.
The mounting position of replacement is to be identical with originals. The substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire or other hazards.

ABBREVIATIONS

1. Integrated circuit (IC)

2. Capacitor (Cap)

MF·········microfarad
PF·········picofarad(micro-microfarad)

3. Resistor (Res)

All resistance values are in ohms.
K ·········Kilo(1000)
M ·········Mega(1000000)
W ·········Watt

4. Tolerance

Symbol	G	J	K	M	N	Z	P	A
%	± 2	± 5	±10	±20	±30	+80 -20	+100 -0	+100 -10